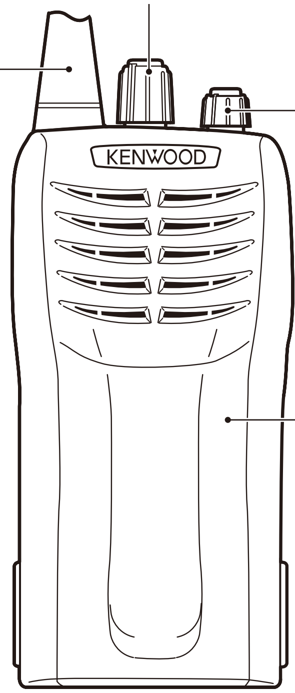
UHF FM TRANSCEIVER

TK-3102G

SERVICE MANUAL

Kenwood Corporation

B51-8842-00 (N) 554



CONTENTS

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GENERAL

INTRODUCTION

SCOPE OF THIS MANUAL

This manual is intended for use by experienced technicians familiar with similar types of commercial grade communications equipment. It contains all required service information for the equipment and is current as of the publication date. Changes which may occur after publication are covered by either Service Bulletins or Manual Revisions. These are issued as required.

ORDERING REPLACEMENT PARTS

When ordering replacement parts or equipment information, the full part identification number should be included. This applies to all parts : components, kits, or chassis. If the part number is not known, include the chassis or kit number of which it is a part, and a sufficient description of the required component for proper identification.

PERSONAL SAFETY

The following precautions are recommended for personal safety:

- DO NOT transmit until all RF connectors are verified secure and any open connectors are properly terminated.
- SHUT OFF and DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.
- This equipment should be serviced by a qualified technician only.

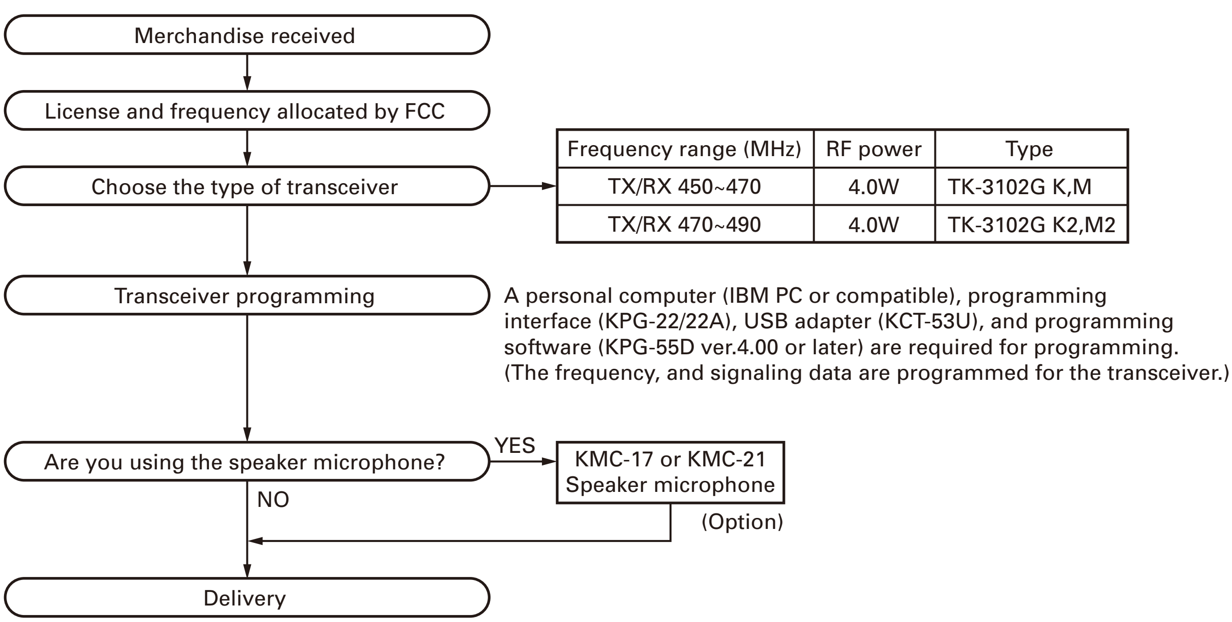
SERVICE

This transceiver is designed for easy servicing. Refer to the schematic diagrams, printed circuit board views, and alignment procedures contained within.

NOTE

You must use KPG-55D version 4.00 or later for this transceiver. KPG-55D versions earlier than version 4.00 will not work properly.

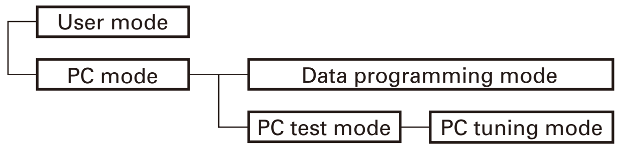
SYSTEM SET-UP



Frequency range (MHz)	RF power	Type
TX/RX 450~470	4.0W	TK-3102G K,M
TX/RX 470~490	4.0W	TK-3102G K2,M2

REALIGNMENT

1. Modes

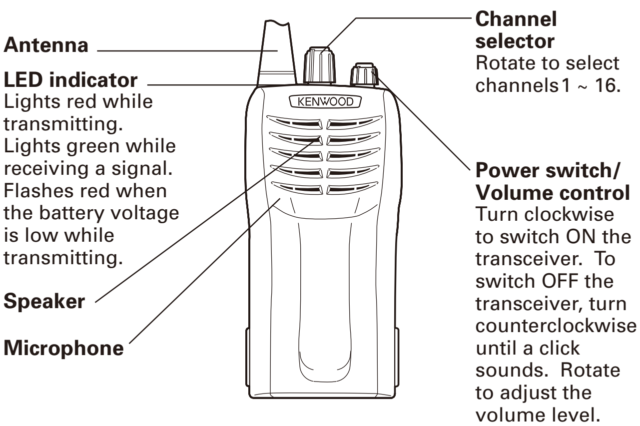


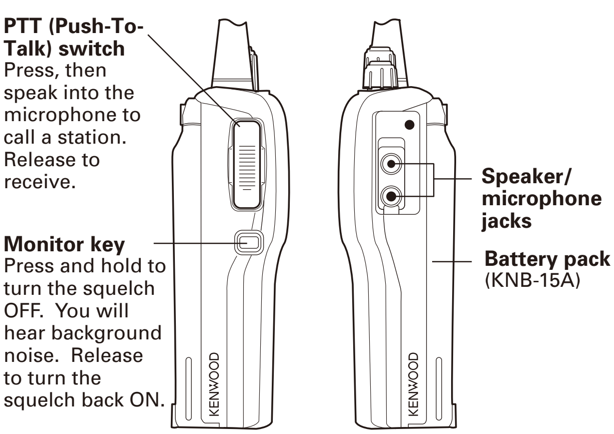
Mode	Function
User mode	For normal use.
PC mode	Used for communication between the transceiver and PC.
Data programming mode	Used to read and write frequency data and other features to and from the transceiver.
PC test mode	Used to check the transceiver using the PC. This feature is included in the FPU.

2. How to Enter Each Mode

Mode	Operation
User mode	Power ON
PC mode	Received commands from PC

3. Getting Acquainted





4. PC Mode

4-1. Preface

The transceiver is programmed by using a personal computer, a programming interface (KPG-22/22A), USB adapter (KCT-53U) and programming software (KPG-55D (ver.4.00 or later)).

The programming software can be used with a PC. Figure 1 shows the setup of a PC for programming.

4-2. Connection Procedure

1. Connect the transceiver to the personal computer with the interface cable and USB adapter (when the interface cable is KPG-22A, the KCT-53U can be used.).

Notes:

- You must install the KCT-53U driver in the computer to use the USB adapter (KCT-53U).
- When using the USB adapter (KCT-53U) for the first time, plug the KCT-53U into a USB port on the computer with the computer power ON.

2. When the POWER is switched on, user mode can be entered immediately. When the PC sends a command, the transceiver enters PC mode.
   When data is transmitting from the transceiver, the red LED lights.
   When data is received by the transceiver, the green LED lights.

Notes :

- The data stored in the personal computer must match the Model Name when it is written into the EEPROM.
- Do not press the [PTT] key during data transmission or reception.
- Change the transceiver to PC mode, then attach the interface cable.

4-3. KPG-22/KPG-22A Description (PC programming interface cable : Option)

The KPG-22/22A is required to interface the transceiver with the computer. It has a circuit in its D-sub connector (KPG-22: 25-pin, KPG-22A: 9-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-22/22A connects the SP/MIC connector of the transceiver to the RS-232C serial port of the computer.

4-4. KCT-53U Description (USB adapter : Option)

The KCT-53U is a cable which connects the KPG-22A to a USB port on a computer.

When using the KCT-53U, install the supplied CD-ROM (with driver software) in the computer. The KCT-53U driver runs under Windows 2000 or XP.

REALIGNMENT

4-5. Programming Software Description

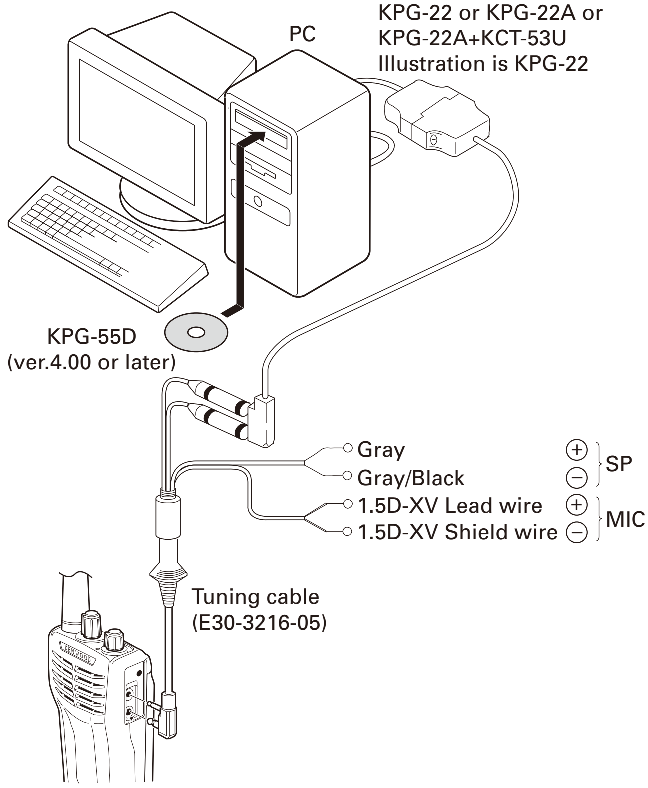
The KPG-55D (ver.4.00 or later) is the programming software for the transceiver supplied on a CD-ROM. This software runs under Windows 2000, XP or Vista (32-bit) on a PC.

4-6. Programming with PC

If data is transferred to the transceiver from a PC with the KPG-55D (ver.4.00 or later), the data for each set can be modified.

Data can be programmed into the EEPROM in RS-232C format via the SP/MIC jack.

In this mode the PTT line operate as RXD data line.



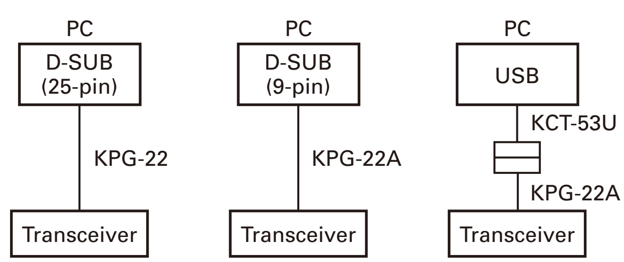
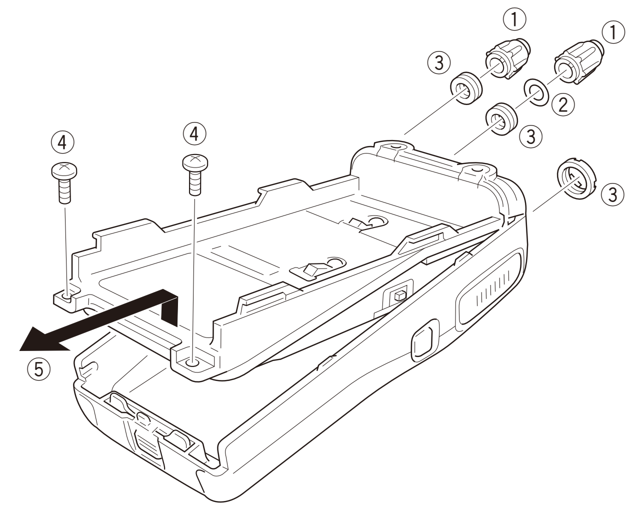


Fig. 1

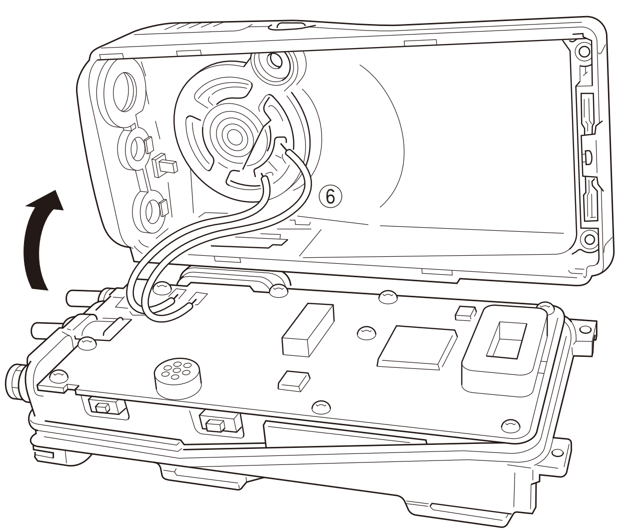
DISASSEMBLY FOR REPAIR

■ Removing the case assembly from the chassis

1. Remove the two knobs ①, cushion ② and three round nuts ③.
2. Remove the two screws ④.
3. Expand the right and left sides of the bottom of the case assembly, then lift and remove the chassis from the case assembly ⑤.

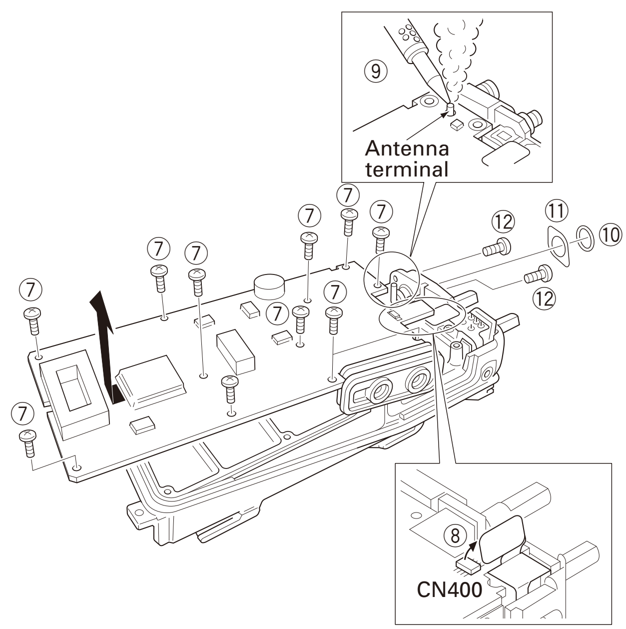


4. Taking care not to cut the speaker lead ⑥, open the chassis and case assembly.



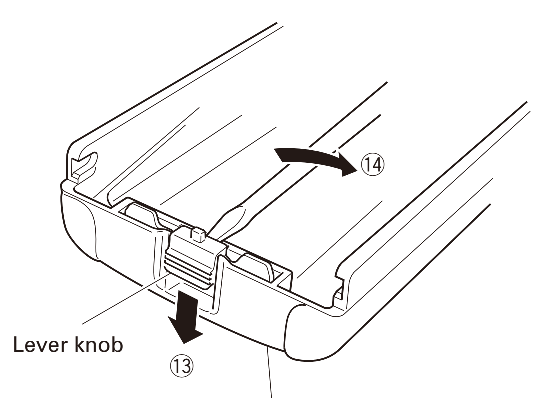
■ Removing the TX-RX unit from the chassis

1. Remove the eleven screws ⑦.
2. Remove the VOL/CH FPC from the TX-RX unit connector (CN400) ⑧.
3. Remove the solder from the antenna terminal using a soldering iron, then lift the unit off ⑨.
4. Remove the waterproof packing ⑩ and cushion ⑪ from the antenna connector.
   Note: The cushion cannot be reused. Affix a new cushion when you remove the cushion.
5. Remove the two screws ⑫ and remove the antenna connector.
   Note: When reassembling the unit in the chassis, be sure to solder the antenna terminal.



■ Removing the lever

1. Press down the lever on the lower case ⑬, insert a small flat-head screwdriver into the space between the case and lever, open the case carefully ⑭ and lift the lever off.
   Note: Do not force to remove the lever from the case.



CIRCUIT DESCRIPTION

1. Frequency Configuration

The receiver utilizes double conversion. The first IF is 38.85MHz and the second IF is 450kHz. The first local oscillator signal is supplied from the PLL circuit.

The PLL circuit in the transmitter generates the necessary frequencies. Fig. 1 shows the frequencies.

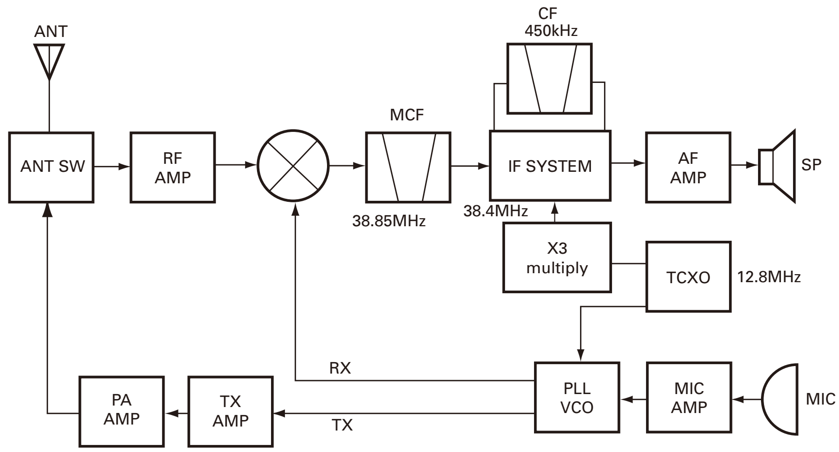


Fig. 1 Frequency configuration

2. Receiver

The receiver is double conversion superheterodyne, designed to operate in the frequency range of 450 to 470MHz (K, M), 470 to 490MHz (K2, M2).

The frequency configuration is shown in Fig. 1.

1) Front-end RF Amplifier

An incoming signal from the antenna is applied to an RF amplifier (Q203) after passing through a transmit/receive switch circuit (D102 and D103 are off) and a 3-pole LC filter. After the signal is amplified (Q203), the signal is filtered by a band pass filter (a 3-pole LC filter) to eliminate unwanted signals before it is passed to the first mixer.

The voltage of these diodes are controlled by to track the MPU (IC403) center frequency of the band pass filter. (See Fig. 2)

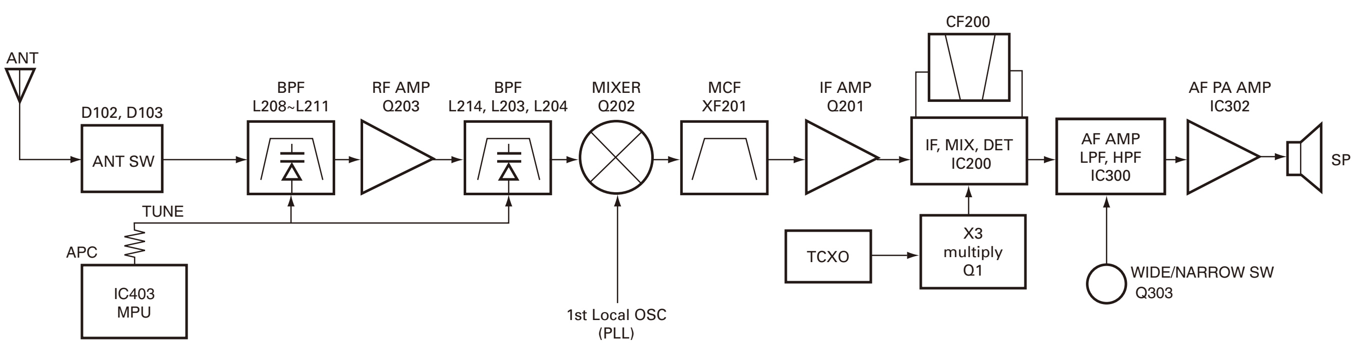


Fig. 2 Receiver section configuration

2) First Mixer

The signal from the RF amplifier is heterodyned with the first local oscillator signal from the PLL frequency synthesizer circuit at the first mixer (Q202) to create a 38.85MHz first intermediate frequency (1st IF) signal. The first IF signal is then fed through two monolithic crystal filters (MCFs : XF201) to further remove spurious signals.

3) IF Amplifier

The first IF signal is amplified by Q201, and then enters IC200 (FM processing IC). The signal is heterodyned again with a second local oscillator signal within IC200 to create a 450kHz second IF signal. The second IF signal is then fed through a 450kHz ceramic filter (CF200) to further eliminate unwanted signals before it is amplified and FM detected in IC200.

4) AF Amplifier

The recovered AF signal obtained from IC200 is amplified by IC300 (1/4), filtered by the IC300 low-pass filter (2/4) and IC300 high-pass filter (3/4) and (4/4), and de-emphasized by R303 and C306. The AF signal is then passed through a WIDE/NARROW switch (Q303). The processed AF signal passes through an AF volume control and is amplified to a sufficient level to drive a loud speaker by an AF power amplifier (IC302).

CIRCUIT DESCRIPTION

XF201:L71-0522-05

Item	Rating
Nominal center frequency	38.850MHz
Pass band width	±5.0kHz or more at 3dB
40dB stop band width	±20.0kHz or less
Ripple	1.0dB or less
Insertion loss	4.0dB or less
Guaranteed attenuation	80dB or more at fo -910kHz
Terminal impedance	610Ω /3PF

CF200:L72-0958-05

Item	Rating
Nominal center frequency	450kHz
6dB band width	±6.0kHz or more
50dB band width	±12.5kHz or less
Ripple	2.0dB or less at fo ±4kHz
Insertion loss	6.0dB or less
Guaranteed attenuation	35.0dB or more at fo ±100kHz
Terminal impedance	2.0kΩ

5) Squelch

Part of the AF signal from the IC enters the FM IC again, and the noise component is amplified and rectified by a filter and an amplifier to produce a DC voltage corresponding to the noise level.

The DC signal from the FM IC goes to the analog port of the microprocessor (IC403). IC403 determines whether to output sounds from the speaker by checking whether the input voltage is higher or lower than the preset value.

To output sounds from the speaker, IC403 sends a high signal to the MUTE and AFCO lines and turns IC302 on through Q302, Q304, Q305, Q306 and Q307.(See Fig. 3)

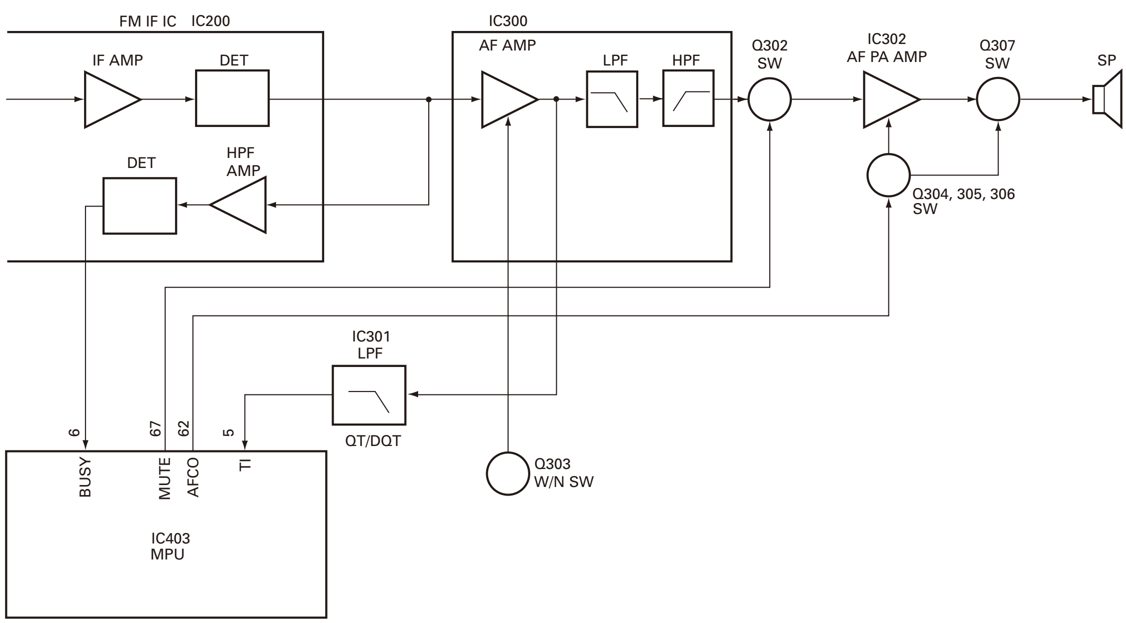


Fig. 3 AF amplifier and squelch

6) Receive Signaling

QT/DQT

300 Hz and higher audio frequencies of the output signal from IF IC are cut by a low-pass filter (IC301). The resulting signal enters the microprocessor (IC403). IC403 determines whether the QT or DQT matches the preset value, and controls the MUTE and AFCO and the speaker output sounds according to the squelch results.

3. PLL Frequency Synthesizer

The PLL circuit generates the first local oscillator signal for reception and the RF signal for transmission.

1) PLL

The frequency step of the PLL circuit is 5 or 6.25kHz.

A 12.8MHz reference oscillator signal is divided at IC1 by a fixed counter to produce the 5 or 6.25kHz reference frequency. The voltage controlled oscillator (VCO) output signal is buffer amplified by Q6, then divided in IC1 by a dual-module programmable counter . The divided signal is compared in phase with the 5 or 6.25kHz reference signal in the phase comparator in IC1. The output signal from the phase comparator is filtered through a low-pass filter and passed to the VCO to control the oscillator frequency. (See Fig.4)

CIRCUIT DESCRIPTION

2) VCO

The operating frequency is generated by Q4 in transmit mode and Q3 in receive mode. The oscillator frequency is controlled by applying the VCO control voltage, obtained from the phase comparator, to the varactor diodes (D2 and D4 in transmit mode and D1 and D3 in receive mode). The T/R pin is set high in receive mode causing Q5 and Q7 to turn Q4 off, and turn Q3 on . The T/R pin is set low in transmit mode. The outputs from Q3 and Q4 are amplified by Q6 and sent to the buffer amplifiers.

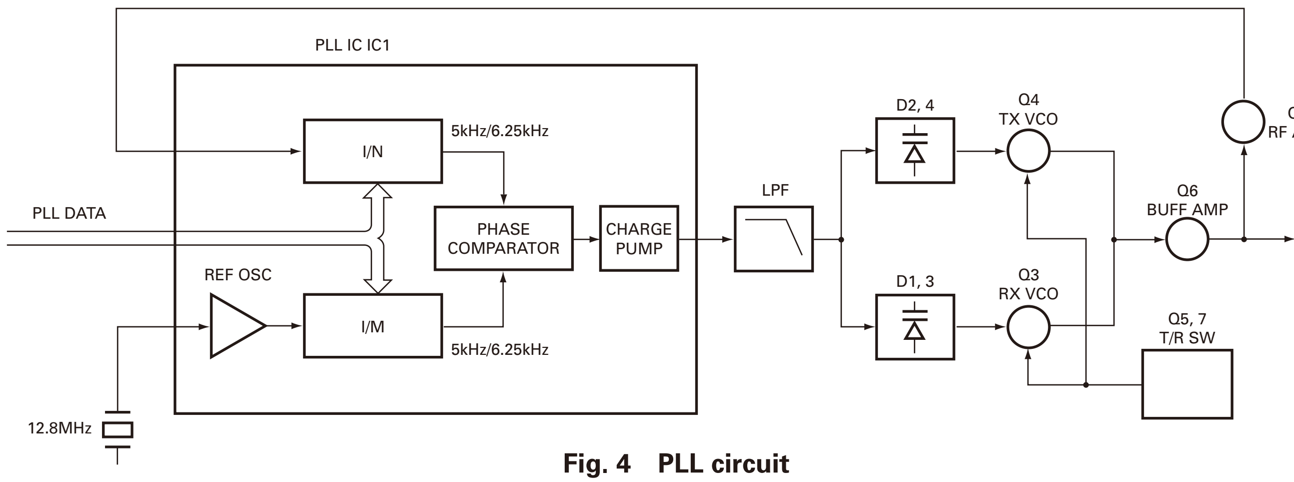


Fig. 4 PLL circuit

3) Unlock Detector

If a pulse signal appears at the LD pin of IC1, an unlock condition occurs, and the DC voltage obtained from D7, R6, and C1 causes the voltage applied to the UL pin of the microprocessor to go low. When the microprocessor detects this condition, the transmitter is disabled, ignoring the push-totalk switch input signal. (See Fig. 5)

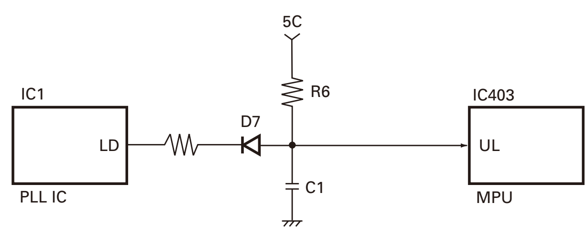


Fig. 5 Unlock detector circuit

4. Transmitter

1) Transmit Audio

The modulation signal from the microphone is amplified by IC500 (1/2), passes through a pre-emphasis circuit, and amplified by the other IC500 (1/2) to perform IDC operation.

The signal then passes through a low-pass filter (splatter filter) (Q501 and Q502) and cuts 3kHz and higher frequencies. The resulting signal goes to the VCO through the VCO modulation terminal for direct FM modulation. (See Fig. 6)

2) QT/DQT Encoder

A necessary signal for QT/DQT encoding is generated by IC403 and FM-modulated to the PLL reference signal. Since the reference OSC does not modulate the loop characteristic frequency or higher, modulation is performed at the VCO side by adjusting the balance. (See Fig. 6)

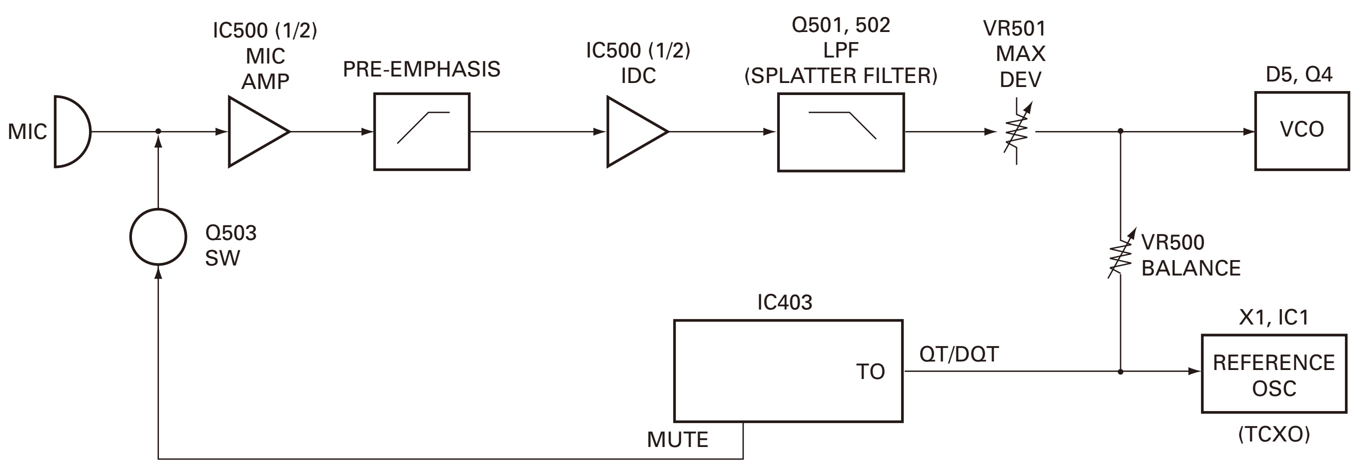


Fig. 6 Transmit audio and QT/DQT encoder

CIRCUIT DESCRIPTION

3) VCO and RF Amplifier

The transmit signal obtained from the VCO buffer amplifier Q100, is amplified by Q101 and Q102. This amplified signal is passed to the power amplifier, Q105 and Q107, which consists of a 2-stage FET amplifier and is capable of producing up to 4W of RF power. (See Fig. 7)

4) ANT Switch and LPF

The RF amplifier output signal is passed through a low-pass filter network and a transmit/receive switching circuit before it is passed to the antenna terminal. The transmit/receive switching circuit is comprised of D101, D102 and D103. D102 and D103 are turned on (conductive) in transmit mode and off (isolated) in receive mode.

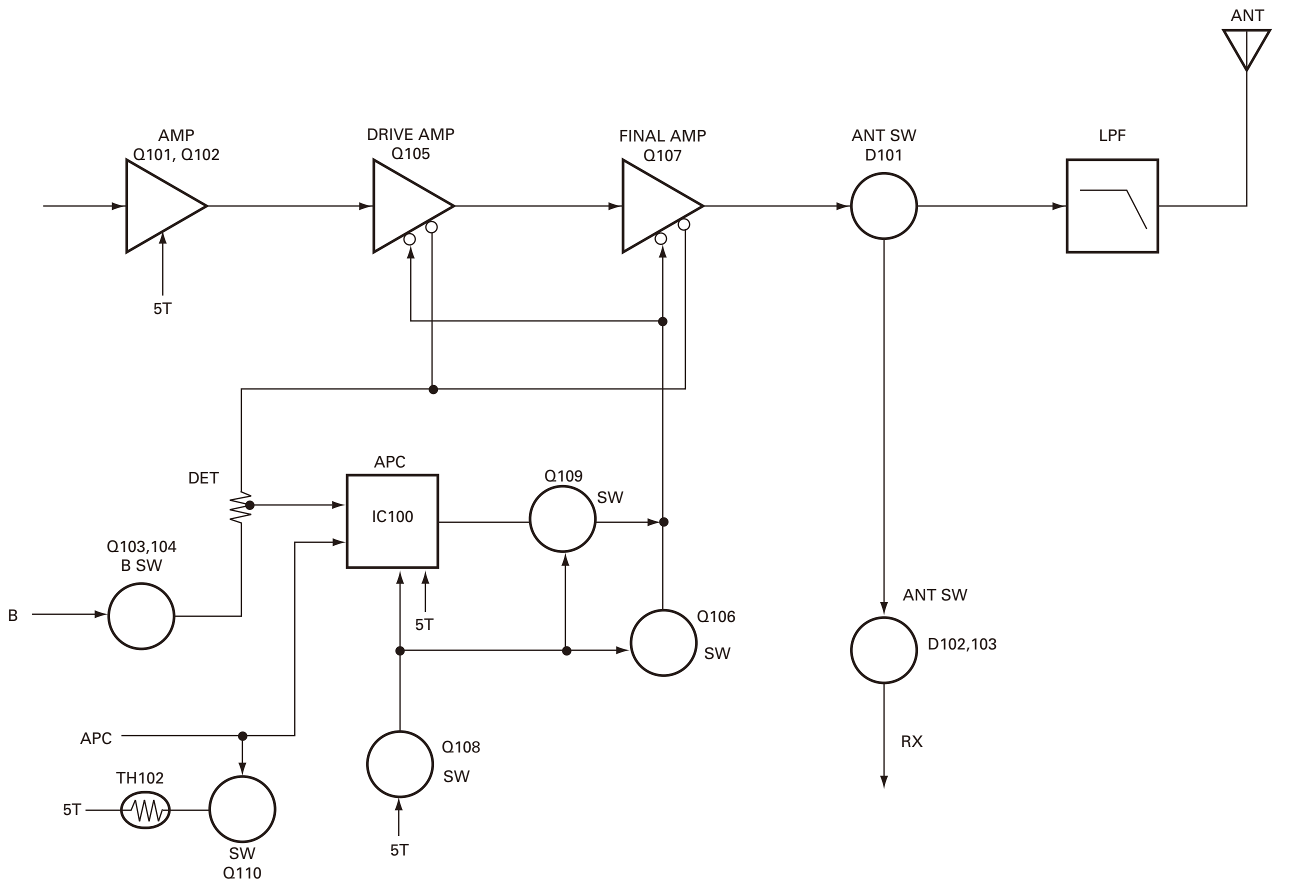


Fig. 7 APC system

5) APC

The automatic power control (APC) circuit stabilizes the transmitter output power at a predetermined level by sensing the drain current of the final amplifier Field Effect Transistor (FET) . The voltage comparator, IC100 (2/2), compares the voltage obtained from the above drain current with a reference voltage which is set using the microprocessor. An APC voltage proportional to the difference between the sensed voltage and the reference voltage appears at the output of IC100 (1/2). This output voltage controls the gate of the FET power amplifier, which keeps the transmitter output power constant. The transmitter output power can be varied by the microprocessor which in turn changes the reference voltage and hence, the output power.

6) Thermal Protection Circuit

When the thermistor (TH102) reaches about 80°C, the protection circuit turns on Q110 to protect transmitting final amplifier (Q107) from the over heating.

5. Power Supply

A 5V reference power supply [5M] for the control circuit is derived from an internal battery. This reference is used to provide a 5V supply in transmit mode [5T], a 5V supply in receive mode [5R], and a 5V supply common in both modes [5C] based on the control signal sent from the microprocessor.

6. Control System

The IC403 MPU operates at 7.37MHz . This oscillator has a circuit that shifts the frequency according to the EEPROM data.

SEMICONDUCTOR DATA

Microprocessor: 38268MCA060GU (TX-RX unit IC403)

Pin No.	Port Name	I/O	Function
1,2	VC1,VC2	O	NC
3	NC	I	NC
4	TIBI	I	QT/DQT external circuit center point input
5	TI	I	QT/DQT signal input
6	BUSY	I	Busy input
7	BATT	I	Battery voltage detection
8	NC	I	NC
9	VCCN	O	Frequency regulation output
10	APC	O	TX : Auto power control D/A output RX : BPF tuning D/A output
11~14	NC	I	NC
15	BEEP	O	Beep output
16	TO	O	QT/DQT output
17	NC	I	NC
18	PTT	I	[PTT] key input connected to RXD
19	TXD	O	RS-232C output connected to SP/ MIC test (REM)
20	RXD	I	RS-232C input connected to [PTT] line
21	NC	I	NC
22	SELF	I	Self program L : disable
23	MONI	I	[MONI] key input
24~27	NC	I	NC
28~31	ENC3~ENC0	I	Encode input (channel select)
32	INT0	I	Power detection control
33	RST	I	Reset input
34	NC	I	NC
35	NC	O	NC
36	XIN	I	7.3728MHz oscillator
37	XOUT	O	7.3728MHz oscillator
38	VSS	I	GND
39	SHIFT	O	Beat shift H : shift on
40	PABC	O	Final supply H : on
41	WNRC	O	Audio reference sensitivity L : narrow
42	WNTC	O	MAX Dev. control Narrow: H
43~46	NC	I	NC
47	SDA	I/O	EEPROM data line
48	SCL	O	EEPROM clock line
49	UL	I	PLL unlock detection pin L : unlock
50~54	NC	I	NC
55	DT	O	Common data output
56	CK	O	Common clock output
57	NC	O	NC
58	LE	O	PLL IC enable H : latches
59,60	NC	O	NC
61	5MC	O	Control of power supply (5M) for everything except the microprocessor and EEPROM L : Power supply ON
62	AFCO	O	AF amp power supply H : ON
63	RX	O	TX/RX VCO select H : RX
64	GLED	O	Green LED control H : Lit
65	RLED	O	Red LED control H : Lit
66	SAVE	O	Save control H : Save off
67	MUTE	O	Mute control H : MIC mute, L : AF mute
68	5RC	O	Reception power supply control L : on
69	5TC	O	Transmission power supply control H : on
70~88	NC	O	NC
89	VCC	I	Microprocessor power supply,5V input
90	VREF	I	A/D conversion reference voltage ; connected to Vcc
91	AVSS	I	A/D converter power supply ; connected to Vss
92~95	NC	O	NC
96~100	NC	I	NC

FET : 2SK2596-E (Q105)

Absolute Maximum Ratings (Ta=25°C)						
Item	V_{DSS}	V_{GSS}	I_D	Pch*	Tch	Tstg
Rating	17V	±10V	0.4A	3W	150°C	-45~+150°C
				*Tc=25°C		

FET : 2SK2595-E (Q107)

Absolute Maximum Ratings (Ta=25°C)						
Item	V_{DSS}	V_{GSS}	I_D	Pch*	Tch	Tstg
Rating	17V	±10V	1.1A	20W	150°C	-45~+150°C
				*Tc=25°C		

COMPONENTS DESCRIPTION

TX-RX unit (X57-6030-XX)

Ref. No.	Part Name	Description
IC1	IC	Phase locked loop system
IC100	IC	Automatic power control
IC200	IC	IF system
IC300	IC	Audio amp active filter
IC301	IC	Active filter
IC302	IC	Audio power AMP
IC400	IC	Reset switch
IC401	IC	EEPROM
IC402	IC	Voltage detect
IC403	IC	Microprocessor
IC404	IC	Voltage regulator
IC500	IC	MIC AMP/Limiter
Q1	Transistor	Tripler
Q2	Transistor	RF AMP
Q3	FET	VCO RX
Q4	Transistor	VCO TX
Q5	FET	DC switch
Q6	Transistor	RF buffer AMP
Q7	Transistor	DC switch
Q8	Transistor	Ripple filter
Q100	Transistor	RF AMP
Q101	Transistor	TX pre-drive
Q102	Transistor	TX drive
Q103	FET	DC switch
Q104	Transistor	DC switch
Q105	FET	TX drive
Q106	FET	DC switch
Q107	FET	TX final
Q108,109	Transistor	DC switch
Q110	Transistor	Temperature protection switch
Q200	Transistor	DC switch
Q201	Transistor	IF AMP
Q202	FET	Mixer
Q203	FET	Mixer RF AMP
Q300	Transistor	Active filter
Q302	FET	Audio mute switch
Q303~306	Transistor	DC switch
Q307	FET	Audio mute switch
Q400~402	Transistor	DC switch
Q403	Transistor	Beat shift switch
Q404	Transistor	DC switch
Q405	FET	DC switch
Q406~408	Transistor	DC switch
Q500	FET	DC switch

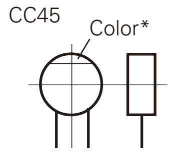
Ref. No.	Part Name	Description
Q501,502	Transistor	Active filter
Q503	Transistor	MIC mute/ AGC
Q504	Transistor	DC switch
D1~4	Variable capacitance diode	Frequency control
D5	Variable capacitance diode	TX modulation
D6	Diode	Current steering
D7	Diode	Unlock detect
D100	Diode	RF switch
D101~103	Diode	Antenna switch
D200	Diode	RF switch
D201~204	Variable capacitance diode	BPF tuning
D300	Diode	Limiter
D400	LED	TX
D401	LED	Busy
D500	Diode	AGC detect
D501	Diode	MIC mute/AGC switch
D502	Diode	Reverse protection

PARTS LIST

CAPACITORS

CC	45	TH	1H	220	J
1	2	3	4	5	6

1 = Type ... ceramic, electrolytic, etc.
2 = Shape ... round, square, etc.
3 = Temp. coefficient
4 = Voltage rating
5 = Value
6 = Tolerance



• Capacitor value

010 = 1pF
100 = 10pF
101 = 100pF
102 = 1000pF = 0.001μF
103 = 0.01μF

2 2 0 = 22pF
- 1st number
- 2nd number
- Multiplier

• Temperature coefficient

1st Word	C	L	P	R	S	T	U
Color*	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	–80	–150	–220	–330	–470	–750

2nd Word	G	H	J	K	L
ppm/°C	±30	±60	±120	±250	±500

Example : CC45TH = –470±60ppm/°C

• Tolerance (More than 10pF)

Code	C	D	G	J	K	M	X	Z	P	No code
(%)	±0.25	±0.5	±2	±5	±10	±20	+40 –20	+80 –20	+100 –0	More than 10μF : –10~+50 Less than 4.7μF : –10~+75

(Less than 10pF)

Code	B	C	D	F	G
(pF)	±0.1	±0.25	±0.5	±1	±2

• Voltage rating

1st word \ 2nd word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	–
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	–
3	1000	1250	1600	2000	2500	2150	4000	5000	6300	8000	–

• Chip capacitors

(EX)	CC	73	F	SL	1H	000	J
	1	2	3	4	5	6	7

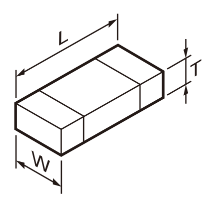
(Chip) (CH, RH, UJ, SL)

(EX)	CK	73	F	F	1H	000	Z
	1	2	3	4	5	6	7

(Chip) (B, F)

Refer to the table above.
1 = Type
2 = Shape
3 = Dimension
4 = Temp. coefficient
5 = Voltage rating
6 = Value
7 = Tolerance

• Dimension



Chip capacitor

Code	L	W	T
Empty	5.6±0.5	5.0±0.5	Less than 2.0
A	4.5±0.5	3.2±0.4	Less than 2.0
B	4.5±0.5	2.0±0.3	Less than 2.0
C	4.5±0.5	1.25±0.2	Less than 1.25
D	3.2±0.4	2.5±0.3	Less than 1.5
E	3.2±0.2	1.6±0.2	Less than 1.25
F	2.0±0.3	1.25±0.2	Less than 1.25
G	1.6±0.2	0.8±0.2	Less than 1.0
H	1.0±0.05	0.5±0.05	0.5±0.05

Chip resistor

Code	L	W	T
E	3.2±0.2	1.6±0.2	1.0
F	2.0±0.3	1.25±0.2	1.0
G	1.6±0.2	0.8±0.2	0.5±0.1
H	1.0±0.05	0.5±0.05	0.35±0.05

RESISTORS

• Chip resistor (Carbon)

(EX)	RD	73	E	B	2B	000	J
	1	2	3	4	5	6	7

(Chip) (B, F)

• Carbon resistor (Normal type)

(EX)	RD	14	B	B	2C	000	J
	1	2	3	4	5	6	7

1 = Type
2 = Shape
3 = Dimension
4 = Temp. coefficient
5 = Rating wattage
6 = Value
7 = Tolerance

• Rating wattage

Code	Wattage	Code	Wattage	Code	Wattage
1J	1/16W	2C	1/6W	3A	1W
2A	1/10W	2E	1/4W	3D	2W
2B	1/8W	2H	1/2W		

PARTS LIST

✻ New Parts. ⚠indicates safety critical components.
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

L : Scandinavia **K** : USA **P** : Canada
Y : PX (Far East, Hawaii) **T** : England **E** : Europe
Y : AAFES (Europe) **X** : Australia **M** : Other Areas

TK-3102G (Y50-6420-XX)
TX-RX UNIT (X57-6030-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
TK-3102G					
1	1A	✻	A02-4049-03	PLASTIC CABINET ASSY	
2	3B		A82-0034-03	REAR PANEL	
4	2D		B09-0351-03	CAP (SP/MIC) ACCESSORY	
5	1D	✻	B62-2103-00	INSTRUCTION MANUAL	
7	2B		E04-0449-05	RF COAXIAL RECEPTACLE (SMA)	
8	3B		E23-1183-04	RELAY TERMINAL (BATT-)	
9	1A		G01-0881-04	COIL SPRING (BATT RELEASE)	
10	3B		G10-1288-04	FIBROUS SHEET (CHASSIS)	
11	-		G11-2583-04	SHEET (HOLDER)	
12	3B	✻	G11-2588-14	RUBBER SHEET (CHASSIS)	
13	1B	✻	G11-4478-04	SHEET (CH)	
15	3B		G13-1709-04	CUSHION (VOL)	
16	3B		G13-1763-04	CUSHION (TERMINAL BATT+)	
17	3B		G13-1867-14	CUSHION (TERMINAL BATT-)	
18	2B		G13-1959-04	CUSHION (RECEPTACLE)	
19	2A		G13-1985-04	CUSHION (X400)	
21	2B		G13-1986-04	CUSHION (VR501)	
22	3B		G13-2069-24	CUSHION (HOLDER)	
23	2B		G53-0791-03	PACKING (SP/MIC)	
24	2A		G53-0842-13	PACKING (SP)	
25	2B		G53-0860-04	PACKING (CHASSIS)	
27	2B		G53-1528-04	PACKING (SMA)	
30	1D		H25-0085-04	PROTECTION BAG (100/200/0.07)	
31	2D		H25-2012-04	PROTECTION BAG (75/100/0.08)	
33	1A		J19-1572-04	HOLDER (BATT RELEASE)	
34	2B		J19-5344-13	HOLDER (VOL/CH)	
35	2D		J21-4493-04	SP/MIC HOLDER ACCESSORY	
36	2D		J29-0734-05	BELT CLIP ACCESSORY	
37	1B		J69-0345-04	RING (VOL,CH)	
39	2B		J82-0059-15	FPC	
41	1B		K29-5255-03	KNOB (VOL)	
42	1A		K29-5274-03	BUTTON KNOB (MONI)	
43	1A		K29-5275-23	BUTTON KNOB (PTT)	
44	1B		K29-5278-03	KNOB (CH)	
45	1A		K29-5337-03	LEVER KNOB (BATT RELEASE)	
A	2B		N09-2438-05	BINDING HEAD SCREW (SMA)	
B	1B	✻	N14-0581-44	CIRCULAR NUT (VOL,CH)	
C	1B	✻	N14-0804-24	CIRCULAR NUT (SMA)	
D	3A		N30-2606-48	PAN HEAD MACHINE SCREW	
E	3B		N79-2030-48	PAN HEAD TAPTITE SCREW	
F	2A,2B		N83-2005-48	PAN HEAD TAPTITE SCREW	
47	2D		N99-0396-15	SCREW SET ACCESSORY	
49	2B		R31-0647-05	VARIABLE RESISTOR	
51	2B		S60-0424-25	ROTARY SWITCH	
53	1A		T07-0369-15	SPEAKER	
54	2D		T90-1039-25	WHIP ANTENNA ACCESSORY	
56	1C	✻	W08-0479-25	AC ADAPTER (AC 120V) ACCESSORY	K,K2
58	1C		W08-0558-35	AC ADAPTER (AC 230V) ACCESSORY	M,M2
59	1C	✻	W08-0598-15	CHARGER ACCESSORY	
60	2C		W09-0940-25	BATTERY ASSY ACCESSORY	
TX-RX UNIT (X57-6030-XX) -10 : K,M -11 : K2,M2					
D400			B30-2156-05	LED (RED)	
D401			B30-2157-05	LED (YELLOW)	
C1			CK73GB1C104K	CHIP C 0.10UF K	
C2,3			CC73GCH1H101J	CHIP C 100PF J	
C4			CK73GB1C104K	CHIP C 0.10UF K	
C5			CS77AA0J4R7M	CHIP TNTL 4.7UF 6.3WV	
C6			CC73GCH1H101J	CHIP C 100PF J	
C7			CK73GB1H471K	CHIP C 470PF K	
C9			CC73GCH1H130J	CHIP C 13PF J	
C10			CC73GCH1H470J	CHIP C 47PF J	
C12			CS77CA1V0R1M	CHIP TNTL 0.1UF 35WV	
C14			CC73GCH1H130J	CHIP C 13PF J	
C15			CS77CA1C010M	CHIP TNTL 1.0UF 16WV	
C16			CC73GCH1H680J	CHIP C 68PF J	
C17			CK73GB1H331K	CHIP C 330PF K	
C18			CS77CA1V0R1M	CHIP TNTL 0.1UF 35WV	
C19,20			CK73GB1H103K	CHIP C 0.010UF K	
C23			CS77AA0J100M	CHIP TNTL 10UF 6.3WV	
C24			CK73GB1H103K	CHIP C 0.010UF K	
C25			CK73GB1H471K	CHIP C 470PF K	
C26			CC73GCH1H121J	CHIP C 120PF J	
C27			CK73GB1H471K	CHIP C 470PF K	
C28			CC73GCH1H330J	CHIP C 33PF J	
C29			CC73GCH1H020C	CHIP C 2.0PF C	
C30			CK73GB1H102K	CHIP C 1000PF K	
C31			CC73GCH1H101J	CHIP C 100PF J	
C34			CC73GCH1H180J	CHIP C 18PF J	K,M
C34			CC73GCH1H330J	CHIP C 33PF J	K2,M2
C35			CC73GCH1H060B	CHIP C 6.0PF B	K2,M2
C35			CC73GCH1H070B	CHIP C 7.0PF B	K,M
C36			CC73GCH1H080B	CHIP C 8.0PF B	
C37			CC73GCH1H150J	CHIP C 15PF J	K2,M2
C37			CC73GCH1H330J	CHIP C 33PF J	K,M
C38			CC73GCH1H020B	CHIP C 2.0PF B	K2,M2
C38			CC73GCH1H050C	CHIP C 5.0PF C	K,M
C39			CC73GCH1H080B	CHIP C 8.0PF B	K2,M2
C39			CC73GCH1H080D	CHIP C 8.0PF D	K,M
C40			CC73GCH1H0R5B	CHIP C 0.5PF B	
C41			CC73GCH1H040B	CHIP C 4.0PF B	K,M
C41			CC73GCH1H050B	CHIP C 5.0PF B	K2,M2
C42			CC73GCH1H100D	CHIP C 10PF D	K,M
C42			CC73GCH1H130J	CHIP C 13PF J	K2,M2
C43			CK73GB1H102K	CHIP C 1000PF K	
C44			CC73GCH1H050B	CHIP C 5.0PF B	K2,M2
C44			CC73GCH1H060B	CHIP C 6.0PF B	K,M
C45			CC73GCH1H060B	CHIP C 6.0PF B	K2,M2
C45			CC73GCH1H100C	CHIP C 10PF C	K,M
C46			CK73GB1H471K	CHIP C 470PF K	

PARTS LIST

TX-RX UNIT (X57-6030-XX)

Ref. No.	Address	New parts	Parts No.	Description			Desti-nation
C47			CC73GCH1H010B	CHIP C	1.0PF	B	
C48			CK73GB1H471K	CHIP C	470PF	K	
C49			CC73GCH1H0R5B	CHIP C	0.5PF	B	
C51			CC73GCH1H680J	CHIP C	68PF	J	
C52			CK73GB1H471K	CHIP C	470PF	K	
C53			CC73GCH1H060D	CHIP C	6.0PF	D	
C54			CC73GCH1H030B	CHIP C	3.0PF	B	
C55			CK73GB1H471K	CHIP C	470PF	K	
C56			CS77AA0J4R7M	CHIP TNTL	4.7UF	6.3WV	
C100			CC73GCH1H220J	CHIP C	22PF	J	
C101-103			CK73GB1H471K	CHIP C	470PF	K	
C104			CK73GB1C104K	CHIP C	0.10UF	K	
C105			CC73GCH1H060D	CHIP C	6.0PF	D	
C106,107			CK73GB1H471K	CHIP C	470PF	K	
C108			CC73GCH1H070D	CHIP C	7.0PF	D	
C109,110			CK73GB1H471K	CHIP C	470PF	K	
C111			CC73GCH1H060D	CHIP C	6.0PF	D	
C112			CK73GB1H471K	CHIP C	470PF	K	
C113			CK73GB1C104K	CHIP C	0.10UF	K	
C114,115			CK73GB1H471K	CHIP C	470PF	K	
C116			CK73GB1H102K	CHIP C	1000PF	K	
C118			CC73GCH1H270G	CHIP C	27PF	G	K2,M2
C118			CC73GCH1H270J	CHIP C	27PF	J	K,M
C119			CK73GB1H102K	CHIP C	1000PF	K	
C120,121			CK73GB1H471K	CHIP C	470PF	K	
C123			CK73GB1H102K	CHIP C	1000PF	K	
C125			CK73GB1H471K	CHIP C	470PF	K	
C126			CK73FB1A105K	CHIP C	1.0UF	K	
C127			CS77AA1A6R8M	CHIP TNTL	6.8UF	10WV	
C128			CK73GB1H103K	CHIP C	0.010UF	K	
C129			CK73GB1H471K	CHIP C	470PF	K	
C130			CC73FCH1H220G	CHIP C	22PF	G	
C131			CK73GB1C104K	CHIP C	0.10UF	K	
C132			CK73GB1H471K	CHIP C	470PF	K	
C134			CC73GCH1H101J	CHIP C	100PF	J	
C135			CC73GCH1H010C	CHIP C	1.0PF	C	
C136			CC73GCH1H060B	CHIP C	6.0PF	B	K2,M2
C136			CC73GCH1H070B	CHIP C	7.0PF	B	K,M
C138			CC73GCH1H101J	CHIP C	100PF	J	
C139			CK73GB1H471K	CHIP C	470PF	K	
C141			CK73GB1H471K	CHIP C	470PF	K	
C142			CC73GCH1H030B	CHIP C	3.0PF	B	
C143			CK73GB1H471K	CHIP C	470PF	K	
C144			CC73GCH1H020B	CHIP C	2.0PF	B	
C145			CK73GB1H471K	CHIP C	470PF	K	
C147			CC73GCH1H010B	CHIP C	1.0PF	B	K2,M2
C147-149			CC73GCH1H010B	CHIP C	1.0PF	B	K,M
C149			CC73GCH1H010B	CHIP C	1.0PF	B	K2,M2
C150			CC73GCH1H050B	CHIP C	5.0PF	B	K,M
C150			CC73GCH1H4R5B	CHIP C	4.5PF	B	K2,M2
C151			CC73GCH1H1R5B	CHIP C	1.5PF	B	
C153			CC73GCH1H030B	CHIP C	3.0PF	B	K,M
C153			CC73GCH1H2R5B	CHIP C	2.5PF	B	K2,M2
C154			CC73GCH1H010B	CHIP C	1.0PF	B	
C155			CC73GCH1H1R5B	CHIP C	1.5PF	B	
C156			CK73GB1C104K	CHIP C	0.10UF	K	
C157			CK73GB1H471K	CHIP C	470PF	K	
C165			CK73GB1H471K	CHIP C	470PF	K	
C200			CS77AA0J100M	CHIP TNTL	10UF	6.3WV	
C201			CK73GB1H103K	CHIP C	0.010UF	K	

Ref. No.	Address	New parts	Parts No.	Description			Desti-nation
C202			CC73GCH1H270J	CHIP C	27PF	J	
C203			CK73GB1H471K	CHIP C	470PF	K	
C204			CK73GB1H472K	CHIP C	4700PF	K	
C205,206			CC73GCH1H331J	CHIP C	330PF	J	
C207			CK73GB1C104K	CHIP C	0.10UF	K	
C208			CC73GCH1H270J	CHIP C	27PF	J	
C209			CK73GB1C104K	CHIP C	0.10UF	K	
C210			CK73GB1H103K	CHIP C	0.010UF	K	
C211			CK73GB1C104K	CHIP C	0.10UF	K	
C212			CC73GCH1H330J	CHIP C	33PF	J	
C213			CK73GB1C104K	CHIP C	0.10UF	K	
C214			CK73GB1H103K	CHIP C	0.010UF	K	
C215			CC73GCH1H130J	CHIP C	13PF	J	
C217			CK73HB1E103K	CHIP C	0.010UF	K	
C218			CK73GB1H103K	CHIP C	0.010UF	K	K2,M2
C218			CK73GB1H471K	CHIP C	470PF	K	K,M
C219			CC73GCH1H150J	CHIP C	15PF	J	
C220			CK73HB1E103K	CHIP C	0.010UF	K	
C222			CC73HCH1H010B	CHIP C	1.0PF	B	K,M
C222			CC73HCH1H030B	CHIP C	3.0PF	B	K2,M2
C223			CC73GCH1H020C	CHIP C	2.0PF	C	
C224			CK73GB1H471K	CHIP C	470PF	K	
C226			CC73GCH1H0R3B	CHIP C	0.3PF	B	
C227			CC73GCH1H070B	CHIP C	7.0PF	B	K2,M2
C227			CC73GCH1H100C	CHIP C	10PF	C	K,M
C228			CC73GCH1H080B	CHIP C	8.0PF	B	K2,M2
C228			CC73GCH1H270J	CHIP C	27PF	J	K,M
C229			CK73GB1H471K	CHIP C	470PF	K	
C231,232			CK73GB1H471K	CHIP C	470PF	K	
C233,234			CC73GCH1H0R3B	CHIP C	0.3PF	B	
C235			CC73GCH1H040B	CHIP C	4.0PF	B	K2,M2
C235			CC73GCH1H3R5B	CHIP C	3.5PF	B	K,M
C236			CC73GCH1H0R3B	CHIP C	0.3PF	B	K,M
C237			CK73GB1H471K	CHIP C	470PF	K	
C238			CC73GCH1H0R3B	CHIP C	0.3PF	B	
C239			CC73GCH1H020B	CHIP C	2.0PF	B	K2,M2
C239			CC73GCH1H040B	CHIP C	4.0PF	B	K,M
C241			CC73GCH1H060B	CHIP C	6.0PF	B	K,M
C241			CC73GCH1H2R5B	CHIP C	2.5PF	B	K2,M2
C252			CC73GCH1H3R5B	CHIP C	3.5PF	B	K2,M2
C252			CC73GCH1H4R5B	CHIP C	4.5PF	B	K,M
C253,254			CK73GB1H471K	CHIP C	470PF	K	
C255			CC73GCH1H3R5B	CHIP C	3.5PF	B	K2,M2
C255			CC73GCH1H4R5B	CHIP C	4.5PF	B	K,M
C256			CK73GB1C104K	CHIP C	0.10UF	K	
C257			CK73GB1H471K	CHIP C	470PF	K	
C258			CK73GB1C104K	CHIP C	0.10UF	K	
C259			CC73GCH1H030B	CHIP C	3.0PF	B	K,M
C259			CC73GCH1H040B	CHIP C	4.0PF	B	K2,M2
C260			CC73GCH1H030B	CHIP C	3.0PF	B	K2,M2
C260			CC73GCH1H2R5B	CHIP C	2.5PF	B	K,M
C261			CK73HB1A104K	CHIP C	0.10UF	K	
C262			CK73GB1C104K	CHIP C	0.10UF	K	
C263,264			CC73HCH1H220J	CHIP C	22PF	J	
C265			CC73HCH1H470J	CHIP C	47PF	J	K2,M2
C265			CK73HB1H471K	CHIP C	470PF	K	K,M
C267			CC73HCH1H470J	CHIP C	47PF	J	
C300			CK73GB1H822K	CHIP C	8200PF	K	
C301			CK73GB1E183K	CHIP C	0.018UF	K	
C302,303			CK73GB1C104K	CHIP C	0.10UF	K	

PARTS LIST

TX-RX UNIT (X57-6030-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
C304			CS77AA0J100M	CHIP TNTL 10UF 6.3WV	
C305			CK73GB1H103J	CHIP C 0.010UF J	
C306			CK73GB1C473K	CHIP C 0.047UF K	
C307			CS77AA0J100M	CHIP TNTL 10UF 6.3WV	
C308			CK73GB1H562K	CHIP C 5600PF K	
C309			CK73GB1H103J	CHIP C 0.010UF J	
C311			CS77AA0J100M	CHIP TNTL 10UF 6.3WV	
C312			CK73GB1H103J	CHIP C 0.010UF J	
C313			CK73FB1A105K	CHIP C 1.0UF K	
C314			CK73GB1H102K	CHIP C 1000PF K	
C316			CK73GB1H103J	CHIP C 0.010UF J	
C318			CK73GB1C333J	CHIP C 0.033UF J	
C319			CK73GB1C473J	CHIP C 0.047UF J	
C320,321			CK73GB1C333J	CHIP C 0.033UF J	
C322			CK73FB1E104K	CHIP C 0.10UF K	
C327			CK73GB1C104K	CHIP C 0.10UF K	
C330			CC73GCH1H101J	CHIP C 100PF J	
C331			CK73FB1C474K	CHIP C 0.47UF K	
C332			CS77AA0J100M	CHIP TNTL 10UF 6.3WV	
C333			CK73GB1A474K	CHIP C 0.47UF K	
C334			CC73GCH1H221J	CHIP C 220PF J	
C335			CK73GB1C473K	CHIP C 0.047UF K	
C336			CK73GB1H103K	CHIP C 0.010UF K	
C337			CS77CC0J101M	CHIP TNTL 100UF 6.3WV	
C338			CC73GCH1H560J	CHIP C 56PF J	
C400			CK73GB1C104K	CHIP C 0.10UF K	
C402-404			CK73GB1H471K	CHIP C 470PF K	
C406			CK73GB1H471K	CHIP C 470PF K	
C407			CK73GB1H102K	CHIP C 1000PF K	
C408			CS77AA0J100M	CHIP TNTL 10UF 6.3WV	
C409			CC73GCH1H030B	CHIP C 3.0PF B	
C410,411			CK73GB1H471K	CHIP C 470PF K	
C412			CC73GCH1H100D	CHIP C 10PF D	
C413			CK73GB1H102K	CHIP C 1000PF K	
C414			CK73GB1H471K	CHIP C 470PF K	
C415			CC73GCH1H100D	CHIP C 10PF D	
C416			CK73GB1H471K	CHIP C 470PF K	
C417			CK73EF1C105Z	CHIP C 1.0UF Z	
C418			CK73GB1H103K	CHIP C 0.010UF K	
C420,421			CK73GB1H103K	CHIP C 0.010UF K	
C422			CK73HB1E103K	CHIP C 0.010UF K	
C423			CK73GB1C104K	CHIP C 0.10UF K	K2,M2
C423			CK73GB1C333K	CHIP C 0.033UF K	K,M
C424			CK73FB1A105K	CHIP C 1.0UF K	
C425			CK73HB1E103K	CHIP C 0.010UF K	
C427			CK73GB1H471K	CHIP C 470PF K	
C429,430			CK73FB1A105K	CHIP C 1.0UF K	
C500,501			CK73GB1C273K	CHIP C 0.027UF K	
C502			CK73GB1H392K	CHIP C 3900PF K	
C503			CK73GB1C333K	CHIP C 0.033UF K	
C504			CS77AA0J4R7M	CHIP TNTL 4.7UF 6.3WV	
C505			CK73FB1A105K	CHIP C 1.0UF K	
C506			CK73GB1H471K	CHIP C 470PF K	
C507			CS77CP0G2R2M	CHIP TNTL 2.2UF 4WV	
C508			CK73GB1H103K	CHIP C 0.010UF K	
C509			CK73GB1H332K	CHIP C 3300PF K	
C510			CC73GCH1E681J	CHIP C 680PF J	
C511			CK73GB1C473K	CHIP C 0.047UF K	
C512			CK73GB1H332K	CHIP C 3300PF K	
C513			CC73GCH1E681J	CHIP C 680PF J	
C514			CK73GB1C473K	CHIP C 0.047UF K	
C515			CK73GB1H103K	CHIP C 0.010UF K	
C516			CC73GCH1H100D	CHIP C 10PF D	
C517			CK73GB1H471K	CHIP C 470PF K	
C518			CK73GB1E223J	CHIP C 0.022UF J	
C519			CS77AA0J4R7M	CHIP TNTL 4.7UF 6.3WV	
C520			CK73GB1E223J	CHIP C 0.022UF J	
C521			CK73GB1H102K	CHIP C 1000PF K	
C522			CK73FB1E104K	CHIP C 0.10UF K	
C523			CS77CP0G2R2M	CHIP TNTL 2.2UF 4WV	
C524			CK73GB1C273K	CHIP C 0.027UF K	
C525			CK73GB1C104K	CHIP C 0.10UF K	
C526			CK73GB1H471K	CHIP C 470PF K	
C527			CS77AA0J100M	CHIP TNTL 10UF 6.3WV	
C528			CK73GB1H471K	CHIP C 470PF K	
C529			CK73FB1H471K	CHIP C 470PF K	
C530			CC73HCH1H221J	CHIP C 220PF J	
C531			CC73GCH1H221J	CHIP C 220PF J	
C532			CK73GB1H471K	CHIP C 470PF K	
TC1			C05-0383-05	CERAMIC TRIMMER CAPACITOR (6PF)	
TC2			C05-0384-05	CERAMIC TRIMMER CAPACITOR (10PF)	
TC201			C05-0383-05	CERAMIC TRIMMER CAPACITOR (6PF)	
TC202,203			C05-0369-05	CERAMIC TRIMMER CAPACITOR (6PF)	
101	2B		E23-1182-04	RELAY TERMINAL (BATT+)	
CN400			E40-5998-15	PIN ASSY	
J500			E11-0703-05	PHONE JACK (2.5/3.5)	
F500			F53-0130-05	FUSE (3A)	
F500			F53-0392-05	FUSE (3A)	
102	2B		G13-1867-14	CUSHION (TERMINAL BATT+)	
103	2B		G53-0862-04	PACKING (TERMINAL BATT+)	
104	2B		J19-1571-04	HOLDER (TERMINAL BATT+)	
105	2B		J30-1249-04	SPACER (TERMINAL BATT+)	
CF200			L72-0958-05	CERAMIC FILTER	
L1			L92-0140-05	CHIP FERRITE	
L2		*	L41-8295-39	SMALL FIXED INDUCTOR (8.2UH)	
L4			L40-4781-86	SMALL FIXED INDUCTOR (0.47UH)	
L5			L40-5681-86	SMALL FIXED INDUCTOR (0.56UH)	
L6			L40-1875-92	SMALL FIXED INDUCTOR (18NH)	
L7			L92-0140-05	CHIP FERRITE	
L8			L40-1085-92	SMALL FIXED INDUCTOR (100NH)	
L9			L40-3391-86	SMALL FIXED INDUCTOR (3.3UH)	
L10			L92-0140-05	CHIP FERRITE	
L11			L40-3391-86	SMALL FIXED INDUCTOR (3.3UH)	
L12			L40-1085-92	SMALL FIXED INDUCTOR (100NH)	
L13,14			L33-0744-05	SMALL FIXED INDUCTOR	
L15			L40-1085-92	SMALL FIXED INDUCTOR (100NH)	
L16,17			L40-2285-38	SMALL FIXED INDUCTOR (220NH)	
L18			L40-4775-92	SMALL FIXED INDUCTOR (47NH)	K,M
L19			L92-0140-05	CHIP FERRITE	
L20			L40-3391-86	SMALL FIXED INDUCTOR (3.3UH)	
L21			L40-2275-92	SMALL FIXED INDUCTOR (22NH)	
L100			L40-2275-92	SMALL FIXED INDUCTOR (22NH)	
L101			L40-1875-92	SMALL FIXED INDUCTOR (18NH)	
L102			L40-1575-92	SMALL FIXED INDUCTOR (15NH)	
L103			L92-0140-05	CHIP FERRITE	
L104			L41-1098-40	SMALL FIXED INDUCTOR (1000NH)	
L105			L92-0149-05	CHIP FERRITE	

TK-3102G

PARTS LIST

TX-RX UNIT (X57-6030-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
L106			L34-4551-05	AIR-CORE COIL	
L107			L92-0149-05	CHIP FERRITE	
L109			L40-2285-54	SMALL FIXED INDUCTOR (220NH)	
L110			L34-4547-05	AIR-CORE COIL	
L112,113			L34-4547-05	AIR-CORE COIL	
L114			L34-4546-05	AIR-CORE COIL	
L118			L41-1092-44	SMALL FIXED INDUCTOR (1UH)	
L119			L40-2263-92	SMALL FIXED INDUCTOR (2.2NH)	
L200			L41-1095-39	SMALL FIXED INDUCTOR (1.0UH)	K,M
L200			L41-8285-39	SMALL FIXED INDUCTOR (0.82UH)	K2,M2
L202			L40-1575-92	SMALL FIXED INDUCTOR (15NH)	
L203,204			L34-4546-05	AIR-CORE COIL	
L206			L40-1575-92	SMALL FIXED INDUCTOR (15NH)	K,M
L206			L40-1875-92	SMALL FIXED INDUCTOR (18NH)	K2,M2
L207			L40-2775-92	SMALL FIXED INDUCTOR (27NH)	K,M
L207			L40-3375-92	SMALL FIXED INDUCTOR (33NH)	K2,M2
L208			L41-1278-14	SMALL FIXED INDUCTOR (12NH)	
L209,210			L34-4546-05	AIR-CORE COIL	
L211			L41-1278-14	SMALL FIXED INDUCTOR (12NH)	
L212			L34-4554-05	COIL	
L212		✻	L34-4850-15	COIL	
L214			L34-4546-05	AIR-CORE COIL	
L400			L40-2281-86	SMALL FIXED INDUCTOR (0.22UH)	
L401			L92-0140-05	CHIP FERRITE	
L402,403			L40-2281-86	SMALL FIXED INDUCTOR (0.22UH)	
L500			L92-0140-05	CHIP FERRITE	
L501,502			L92-0149-05	CHIP FERRITE	
X1			L77-1877-15	TCXO	
X400		✻	L77-1761-15	CRYSTAL RESONATOR (7.3728MHZ)	
XF201			L71-0522-05	MCF (38.85MHZ)	
106	2B	✻	N78-2640-48	PAN HEAD TAPTITE SCREW	
CP1			RK75GB1J102J	CHIP-COM 1.0K J 1/16W	
R1,2			RK73GB2A102J	CHIP R 1.0K J 1/10W	
R3			RK73GB2A100J	CHIP R 10 J 1/10W	
R4			RK73GB2A102J	CHIP R 1.0K J 1/10W	
R5			RK73GB2A561J	CHIP R 560 J 1/10W	
R6			RK73GB2A154J	CHIP R 150K J 1/10W	
R7			RK73GB2A561J	CHIP R 560 J 1/10W	
R8			RK73GB2A334J	CHIP R 330K J 1/10W	
R9			RK73GB2A272J	CHIP R 2.7K J 1/10W	
R10			RK73GB2A222J	CHIP R 2.2K J 1/10W	
R11			RK73GB2A473J	CHIP R 47K J 1/10W	
R12			RK73GB2A274J	CHIP R 270K J 1/10W	
R13			RK73GB2A000J	CHIP R 0.0 J 1/10W	K,M
R13			RK73GB2A221J	CHIP R 220 J 1/10W	K2,M2
R14			RK73GB2A101J	CHIP R 100 J 1/10W	
R15			RK73GB2A103J	CHIP R 10K J 1/10W	
R16			RK73GB2A473J	CHIP R 47K J 1/10W	
R18			RK73GB2A104J	CHIP R 100K J 1/10W	
R19			RK73GB2A101J	CHIP R 100 J 1/10W	
R20			RK73GB2A102J	CHIP R 1.0K J 1/10W	
R21			RK73GB2A104J	CHIP R 100K J 1/10W	
R22			RK73GB2A473J	CHIP R 47K J 1/10W	
R23			RK73GB2A682J	CHIP R 6.8K J 1/10W	
R24			RK73GB2A822J	CHIP R 8.2K J 1/10W	
R25			RK73GB2A151J	CHIP R 150 J 1/10W	K2,M2
R25,26			RK73GB2A101J	CHIP R 100 J 1/10W	K,M
R26			RK73GB2A221J	CHIP R 220 J 1/10W	K2,M2
R27			RK73GB2A331J	CHIP R 330 J 1/10W	K,M

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
R27			RK73GB2A471J	CHIP R 470 J 1/10W	K2,M2
R28			RK73GB2A220J	CHIP R 22 J 1/10W	K,M
R28			RK73GB2A820J	CHIP R 82 J 1/10W	K2,M2
R29			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R30			RK73GB2A124J	CHIP R 120K J 1/10W	
R31			RK73GB2A101J	CHIP R 100 J 1/10W	
R32			RK73GB2A472J	CHIP R 4.7K J 1/10W	
R33			RK73GB2A102J	CHIP R 1.0K J 1/10W	
R34			RK73GB2A104J	CHIP R 100K J 1/10W	
R100			RK73GB2A332J	CHIP R 3.3K J 1/10W	
R101			RK73GB2A562J	CHIP R 5.6K J 1/10W	
R102			RK73GB2A271J	CHIP R 270 J 1/10W	
R103			RK73GB2A332J	CHIP R 3.3K J 1/10W	
R104			RK73GB2A100J	CHIP R 10 J 1/10W	
R105,106			RK73GB2A332J	CHIP R 3.3K J 1/10W	
R107			RK73GB2A473J	CHIP R 47K J 1/10W	
R108			RK73GB2A331J	CHIP R 330 J 1/10W	
R109			RK73GB2A220J	CHIP R 22 J 1/10W	
R110			RK73GB2A681J	CHIP R 680 J 1/10W	
R111			RK73GB2A220J	CHIP R 22 J 1/10W	
R112			RK73GB2A152J	CHIP R 1.5K J 1/10W	
R113			RK73GB2A331J	CHIP R 330 J 1/10W	
R115			RK73GB2A100J	CHIP R 10 J 1/10W	
R117			RK73GB2A124J	CHIP R 120K J 1/10W	
R118			RK73GB2A473J	CHIP R 47K J 1/10W	
R119			RK73GB2A472J	CHIP R 4.7K J 1/10W	
R120			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R121			RK73GB2A470J	CHIP R 47 J 1/10W	
R122			RK73GB2A681J	CHIP R 680 J 1/10W	
R123			RK73FB2B000J	CHIP R 0.0 J 1/8W	
R124			RK73GB2A681J	CHIP R 680 J 1/10W	
R125,126			RK73GB2A473J	CHIP R 47K J 1/10W	
R127			RK73FB2B000J	CHIP R 0.0 J 1/8W	
R128			RK73GB2A470J	CHIP R 47 J 1/10W	
R130-132			RK73EB2ER39K	CHIP R 0.39 K 1/4W	
R133-138			RK73GH2A154D	CHIP R 150K D 1/10W	
R139			RK73GB2A271J	CHIP R 270 J 1/10W	
R140			RK73GB2A103J	CHIP R 10K J 1/10W	
R141			RK73GB2A473J	CHIP R 47K J 1/10W	
R142			RK73GB2A105J	CHIP R 1.0M J 1/10W	
R143			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R144			RK73GB2A222J	CHIP R 2.2K J 1/10W	
R145			RK73GB2A184J	CHIP R 180K J 1/10W	
R146			RK73GB2A104J	CHIP R 100K J 1/10W	
R147			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R152			RK73GB2A331J	CHIP R 330 J 1/10W	K2,M2
R152			RK73GB2A391J	CHIP R 390 J 1/10W	K,M
R153			RK73GB2A332J	CHIP R 3.3K J 1/10W	
R154			RK73GB2A271J	CHIP R 270 J 1/10W	
R200			RK73GB2A100J	CHIP R 10 J 1/10W	
R201			RK73GB2A102J	CHIP R 1.0K J 1/10W	
R202			RK73GB2A394J	CHIP R 390K J 1/10W	
R203,204			RK73GB2A332J	CHIP R 3.3K J 1/10W	
R205			RK73GB2A153J	CHIP R 15K J 1/10W	
R206			RK73GB2A474J	CHIP R 470K J 1/10W	
R207			RK73GB2A104J	CHIP R 100K J 1/10W	
R208			RK73GB2A684J	CHIP R 680K J 1/10W	
R209			RK73GB2A272J	CHIP R 2.7K J 1/10W	
R210			RK73GB2A471J	CHIP R 470 J 1/10W	
R212			RK73HB1J470J	CHIP R 47 J 1/16W	

PARTS LIST

TX-RX UNIT (X57-6030-XX)

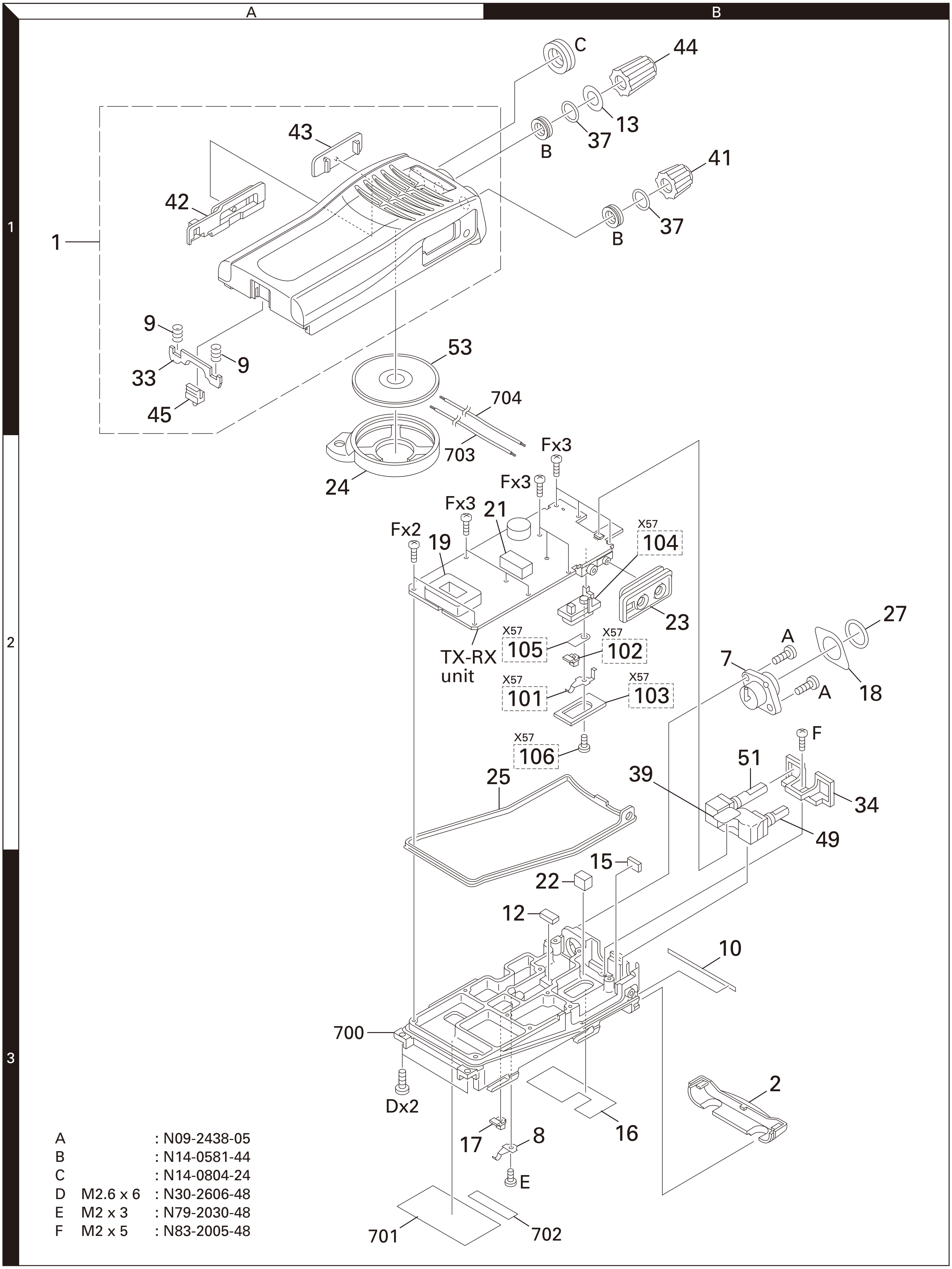
Ref. No.	Address	New parts	Parts No.	Description				Desti-nation
R213			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R214			RK73GB2A103J	CHIP R	10K	J	1/10W	
R215			RK73HB1J151J	CHIP R	150	J	1/16W	K,M
R215			RK73HB1J271J	CHIP R	270	J	1/16W	K2,M2
R216			RK73HB1J103J	CHIP R	10K	J	1/16W	K2,M2
R216			RK73HB1J563J	CHIP R	56K	J	1/16W	K,M
R218			RK73GB2A101J	CHIP R	100	J	1/10W	
R219			RK73GB2A222J	CHIP R	2.2K	J	1/10W	K2,M2
R219			RK73GB2A332J	CHIP R	3.3K	J	1/10W	K,M
R220			RK73GB2A221J	CHIP R	220	J	1/10W	
R221			RK73GB2A104J	CHIP R	100K	J	1/10W	
R222			RK73GB2A102J	CHIP R	1.0K	J	1/10W	
R225			RK73GB2A000J	CHIP R	0.0	J	1/10W	K2,M2
R225			RK73GB2A100J	CHIP R	10	J	1/10W	K,M
R226			RK73HB1J561J	CHIP R	560	J	1/16W	
R227			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R228			RK73GB2A104J	CHIP R	100K	J	1/10W	
R229			RK73HB1J683J	CHIP R	68K	J	1/16W	
R230			RK73HB1J104J	CHIP R	100K	J	1/16W	
R231,232			RK73GB2A104J	CHIP R	100K	J	1/10W	
R234			RK73HB1J104J	CHIP R	100K	J	1/16W	K2,M2
R234,235			RK73HB1J104J	CHIP R	100K	J	1/16W	K,M
R235			RK73HB1J153J	CHIP R	15K	J	1/16W	K2,M2
R236			RK73HB1J103J	CHIP R	10K	J	1/16W	K2,M2
R236			RK73HB1J563J	CHIP R	56K	J	1/16W	K,M
R237			RK73GB2A104J	CHIP R	100K	J	1/10W	K,M
R237			RK73GB2A183J	CHIP R	18K	J	1/10W	K2,M2
R238			RK73HB1J222J	CHIP R	2.2K	J	1/16W	
R239			RK73HB1J271J	CHIP R	270	J	1/16W	
R240			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R300			RK73GH2A913D	CHIP R	91K	D	1/10W	
R301,302			RK73GB2A562J	CHIP R	5.6K	J	1/10W	
R303			RK73GB2A332J	CHIP R	3.3K	J	1/10W	
R304			RK73GB2A105J	CHIP R	1.0M	J	1/10W	
R305			RK73GB2A183J	CHIP R	18K	J	1/10W	
R306			RK73GB2A124J	CHIP R	120K	J	1/10W	
R307			RK73GB2A473J	CHIP R	47K	J	1/10W	
R308			RK73GB2A103J	CHIP R	10K	J	1/10W	
R309			RK73GB2A474J	CHIP R	470K	J	1/10W	
R311			RK73FB2B000J	CHIP R	0.0	J	1/8W	
R312			RK73GB2A123J	CHIP R	12K	J	1/10W	
R313			RK73GB2A104J	CHIP R	100K	J	1/10W	
R314			RK73GH2A474D	CHIP R	470K	D	1/10W	
R315			RK73GH2A394D	CHIP R	390K	D	1/10W	
R316			RK73GB2A274J	CHIP R	270K	J	1/10W	
R317			RK73GH2A274D	CHIP R	270K	D	1/10W	
R318			RK73GB2A184J	CHIP R	180K	J	1/10W	
R320			RK73GB2A473J	CHIP R	47K	J	1/10W	
R321			RK73GB2A223J	CHIP R	22K	J	1/10W	
R322			RK73GH2A224D	CHIP R	220K	D	1/10W	
R323			RK73GB2A104J	CHIP R	100K	J	1/10W	
R324			RK73GB2A562J	CHIP R	5.6K	J	1/10W	
R325			RK73GB2A104J	CHIP R	100K	J	1/10W	
R326			RK73GH2A562D	CHIP R	5.6K	D	1/10W	
R327			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R328			RK73GB2A102J	CHIP R	1.0K	J	1/10W	
R329			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R330			RK73GB2A473J	CHIP R	47K	J	1/10W	
R331			RK73GB2A222J	CHIP R	2.2K	J	1/10W	
R332			RK73GB2A151J	CHIP R	150	J	1/10W	
R333			RK73GB2A474J	CHIP R	470K	J	1/10W	
R334			RK73GB2A100J	CHIP R	10	J	1/10W	K,M
R334			RK73GB2A150J	CHIP R	15	J	1/10W	K2,M2
R335			RK73GB2A563J	CHIP R	56K	J	1/10W	
R336			RK73GB2A333J	CHIP R	33K	J	1/10W	
R338			RK73GB2A473J	CHIP R	47K	J	1/10W	
R339			RK73GB2A822J	CHIP R	8.2K	J	1/10W	
R340			RK73GH2A124D	CHIP R	120K	D	1/10W	
R341			RK73GB2A104J	CHIP R	100K	J	1/10W	
R342			RK73GB2A472J	CHIP R	4.7K	J	1/10W	
R400			RK73GB2A334J	CHIP R	330K	J	1/10W	
R401			RK73GB2A104J	CHIP R	100K	J	1/10W	
R402			RK73GB2A221J	CHIP R	220	J	1/10W	
R403			RK73GB2A181J	CHIP R	180	J	1/10W	
R404			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R405			RK73GB2A102J	CHIP R	1.0K	J	1/10W	
R406			RK73GB2A222J	CHIP R	2.2K	J	1/10W	
R407			RK73GB2A102J	CHIP R	1.0K	J	1/10W	
R408			RK73GB2A104J	CHIP R	100K	J	1/10W	
R409			RK73GB2A102J	CHIP R	1.0K	J	1/10W	
R410			RK73GB2A822J	CHIP R	8.2K	J	1/10W	
R411			RK73GB2A224J	CHIP R	220K	J	1/10W	
R412			RK73GB2A100J	CHIP R	10	J	1/10W	
R413			RK73GB2A102J	CHIP R	1.0K	J	1/10W	
R414,415			RK73GB2A473J	CHIP R	47K	J	1/10W	
R416			RK73GB2A472J	CHIP R	4.7K	J	1/10W	
R417			RK73GB2A100J	CHIP R	10	J	1/10W	
R418			RK73GB2A222J	CHIP R	2.2K	J	1/10W	
R419			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R420			RK73GB2A102J	CHIP R	1.0K	J	1/10W	
R421			RK73HB1J473J	CHIP R	47K	J	1/16W	
R422			RK73GB2A272J	CHIP R	2.7K	J	1/10W	
R423			RK73HB1J473J	CHIP R	47K	J	1/16W	
R424,425			RK73GB2A332J	CHIP R	3.3K	J	1/10W	
R426			RK73GB2A822J	CHIP R	8.2K	J	1/10W	
R427			RK73GB2A102J	CHIP R	1.0K	J	1/10W	
R428			RK73GB2A272J	CHIP R	2.7K	J	1/10W	
R429			RK73GB2A821J	CHIP R	820	J	1/10W	
R430			RK73HB1J101J	CHIP R	100	J	1/16W	
R431			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R432			RK73GB2A103J	CHIP R	10K	J	1/10W	
R433,434			RK73GB2A153J	CHIP R	15K	J	1/10W	
R435			RK73GB2A103J	CHIP R	10K	J	1/10W	
R500,501			RK73GB2A472J	CHIP R	4.7K	J	1/10W	
R502			RK73GB2A823J	CHIP R	82K	J	1/10W	
R503			RK73GB2A183J	CHIP R	18K	J	1/10W	K2,M2
R503			RK73GB2A683J	CHIP R	68K	J	1/10W	K,M
R504			RK73GB2A333J	CHIP R	33K	J	1/10W	
R505			RK73GB2A154J	CHIP R	150K	J	1/10W	
R506			RK73GB2A223J	CHIP R	22K	J	1/10W	
R507			RK73GB2A473J	CHIP R	47K	J	1/10W	
R508			RK73GB2A222J	CHIP R	2.2K	J	1/10W	K2,M2
R508			RK73GB2A562J	CHIP R	5.6K	J	1/10W	K,M
R509			RK73GB2A124J	CHIP R	120K	J	1/10W	
R510			RK73GB2A332J	CHIP R	3.3K	J	1/10W	
R511			RK73GB2A103J	CHIP R	10K	J	1/10W	
R512			RK73GB2A185J	CHIP R	1.8M	J	1/10W	
R513-515			RK73GB2A333J	CHIP R	33K	J	1/10W	
R516			RK73GB2A103J	CHIP R	10K	J	1/10W	
R517			RK73GB2A185J	CHIP R	1.8M	J	1/10W	

PARTS LIST

TX-RX UNIT (X57-6030-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
R518			RK73GB2A682J	CHIP R 6.8K J 1/10W	
R519,520			RK73GB2A333J	CHIP R 33K J 1/10W	
R521			RK73GB2A332J	CHIP R 3.3K J 1/10W	
R522			RK73GB2A182J	CHIP R 1.8K J 1/10W	
R523			RK73GB2A682J	CHIP R 6.8K J 1/10W	
R524			RK73GB2A513J	CHIP R 51K J 1/10W	
R525			RK73GB2A152J	CHIP R 1.5K J 1/10W	
R526,527			RK73GH2A153D	CHIP R 15K D 1/10W	
R528			RK73GB2A754J	CHIP R 750K J 1/10W	
R529			RK73GB2A183J	CHIP R 18K J 1/10W	
R530			RK73GB2A101J	CHIP R 100 J 1/10W	
R531			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R532			RK73GB2A821J	CHIP R 820 J 1/10W	
R533			RK73GB2A104J	CHIP R 100K J 1/10W	
R534			RK73GB2A182J	CHIP R 1.8K J 1/10W	
R535			RK73GB2A471J	CHIP R 470 J 1/10W	
R536			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R537			RK73HB1J101J	CHIP R 100 J 1/16W	
R538			RK73GB2A101J	CHIP R 100 J 1/10W	
R539			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R540			RK73FB2B000J	CHIP R 0.0 J 1/8W	
R541			RK73GB2A472J	CHIP R 4.7K J 1/10W	
R542,543			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R548			RK73GB2A332J	CHIP R 3.3K J 1/10W	
VR1			R32-0736-05	SEMI FIXED VARIABLE RESISTOR	
VR500			R32-0739-05	SEMI FIXED VARIABLE RESISTOR	
VR501			R32-0684-05	SEMI FIXED VARIABLE RESISTOR	
S402,403			S70-0414-05	TACT SWITCH	
MIC500			T91-0651-15	MIC ELEMENT	
D1-4			MA2S376	VARIABLE CAPACITANCE DIODE	
D5			MA360	VARIABLE CAPACITANCE DIODE	K,M
D5			1SV214-F	VARIABLE CAPACITANCE DIODE	K2,M2
D6,7			MA2S111-F	DIODE	
D100			HSC277	DIODE	
D101			HVU131-E	DIODE	
D102,103			HSC277	DIODE	
D200			HSC277	DIODE	
D201-204			HVC350B	VARIABLE CAPACITANCE DIODE	K,M
D201-204			HVC355B	VARIABLE CAPACITANCE DIODE	K2,M2
D300			DA221	DIODE	
D500			1SS372F	DIODE	
D501			DAN222	DIODE	
D502			GN1G	DIODE	
IC1			MB15A02PFV2E1	MOS-IC	
IC100			NJM2904V-ZB	MOS-IC	
IC200			TA31136FNG	MOS-IC	
IC300			NJM2902V-ZB	MOS-IC	
IC301			NJM2904V-ZB	MOS-IC	
IC302			TA7368FG	MOS-IC	
IC400			PST9140NR	MOS-IC	
IC401			AT24C08A10SU18	ROM IC	
IC401			CAT24WC08JI18	ROM IC	
IC402			R3111N451C-F	MOS-IC	
IC403		✻	38268MCA060GU	MICROPROCESSOR IC	
IC404			XC6201P502PR	MOS-IC	
IC500			NJM2100V-ZB	MOS-IC	
Q1			2SC4649 (N,P)	TRANSISTOR	
Q2			2SC5108 (Y)F	TRANSISTOR	
Q3			2SK508NV (K52)	FET	
Q4			2SC4228 (R44)	TRANSISTOR	
Q5			2SJ243-A	FET	
Q6			2SC5108 (Y)F	TRANSISTOR	
Q7			UMC4N	TRANSISTOR	
Q8			2SC4617 (S)	TRANSISTOR	
Q100,101			2SC5108 (Y)F	TRANSISTOR	
Q102		✻	2SC4988-E	TRANSISTOR	
Q103			2SK1824-A	FET	
Q104			UFMMT717	TRANSISTOR	
Q105			2SK2596-E	FET	
Q106			2SK1824-A	FET	
Q107			2SK2595-E	FET	
Q108			DTC114EE	DIGITAL TRANSISTOR	
Q109			DTA144EE	DIGITAL TRANSISTOR	
Q110			DTC114TE	DIGITAL TRANSISTOR	
Q200			DTA114EE	DIGITAL TRANSISTOR	
Q201			2SC4649 (N,P)	TRANSISTOR	
Q202,203			3SK318	FET	
Q300			2SC4617 (S)	TRANSISTOR	
Q302			2SK1824-A	FET	
Q303			DTA144EE	DIGITAL TRANSISTOR	
Q304			DTC144EE	DIGITAL TRANSISTOR	
Q305			2SA1362-F (GR)	TRANSISTOR	
Q306			DTC144EE	DIGITAL TRANSISTOR	
Q307			2SK1588-AZ	FET	
Q400,401			DTC114EE	DIGITAL TRANSISTOR	
Q402			DTA114YE	DIGITAL TRANSISTOR	
Q403			DTC144EE	DIGITAL TRANSISTOR	
Q404			UMG3N	TRANSISTOR	
Q405			UPA672T-A	FET	
Q406			FP210	TRANSISTOR	
Q407			UMG3N	TRANSISTOR	
Q408			DTA123JE	DIGITAL TRANSISTOR	
Q500			2SK1824-A	FET	
Q501,502			2SC4617 (S)	TRANSISTOR	
Q503			2SC4919	TRANSISTOR	
Q504			DTA143ZE	DIGITAL TRANSISTOR	
TH102			157-503-65001	THERMISTOR	
TH500,501			157-302-65801	THERMISTOR	

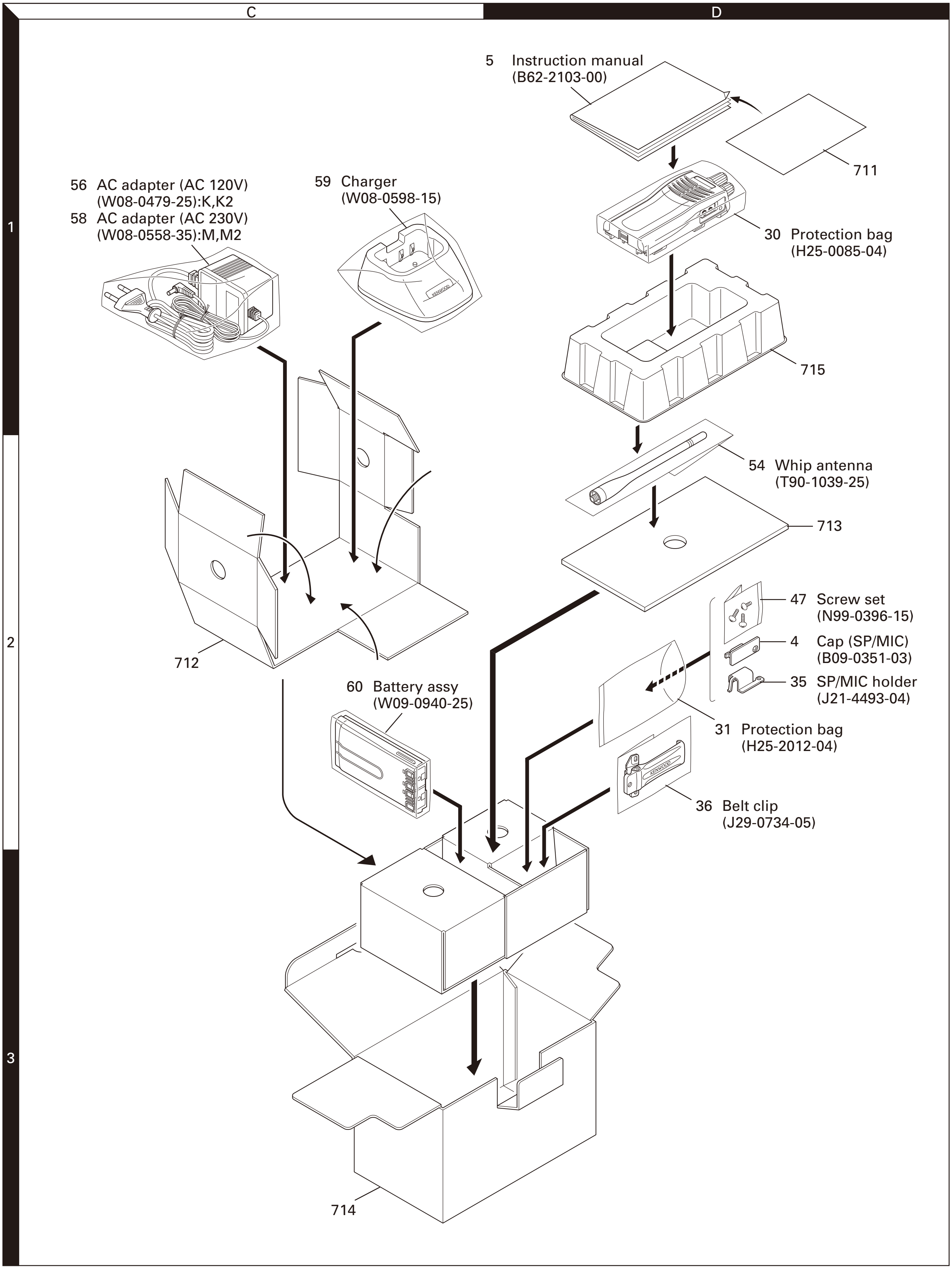
EXPLODED VIEW



A		: N09-2438-05
B		: N14-0581-44
C		: N14-0804-24
D	M2.6 x 6	: N30-2606-48
E	M2 x 3	: N79-2030-48
F	M2 x 5	: N83-2005-48

Parts with the exploded numbers larger than 700 are not supplied.

PACKING



Parts with the exploded numbers larger than 700 are not supplied.

ADJUSTMENT

Test Equipment Required for Alignment

Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range Modulation Output	450 to 490MHz Frequency modulation and external modulation –127dBm/0.1μV to greater than –47dBm/1mV
2. Power Meter	Input Impedance Operation Frequency Measurement Capability	50Ω 450 to 490MHz or more Vicinity of 10W
3. Deviation Meter	Frequency Range	450 to 490MHz
4. Digital Volt Meter (DVM)	Measuring Range Input Impedance	10mV to 10V DC High input impedance for minimum circuit loading
5. Oscilloscope		DC through 30MHz
6. High Sensitivity Frequency Counter	Frequency Range Frequency Stability	10Hz to 1000MHz 0.2ppm or less
7. Ammeter		5A
8. AF Volt Meter (AF VTVM)	Frequency Range Voltage Range	50Hz to 10kHz 1mV to 10V
9. Audio Generator (AG)	Frequency Range Output	50Hz to 5kHz or more 0 to 1V
10. Distortion Meter	Capability Input Level	3% or less at 1kHz 50mV to 10Vrms
11. Spectrum Analyzer	Measuring Range	DC to 1GHz or more
12. Tracking Generator	Center Frequency Output Voltage	50kHz to 600MHz 100mV or more
13. 8Ω Dummy Load		Approx. 8Ω, 3W
14. Regulated Power Supply		5V to 10V, approx. 3A Useful if ammeter equipped

The following parts are required for adjustment

1. Antenna connector adapter

The antenna connector of this radio uses an SMA terminal.

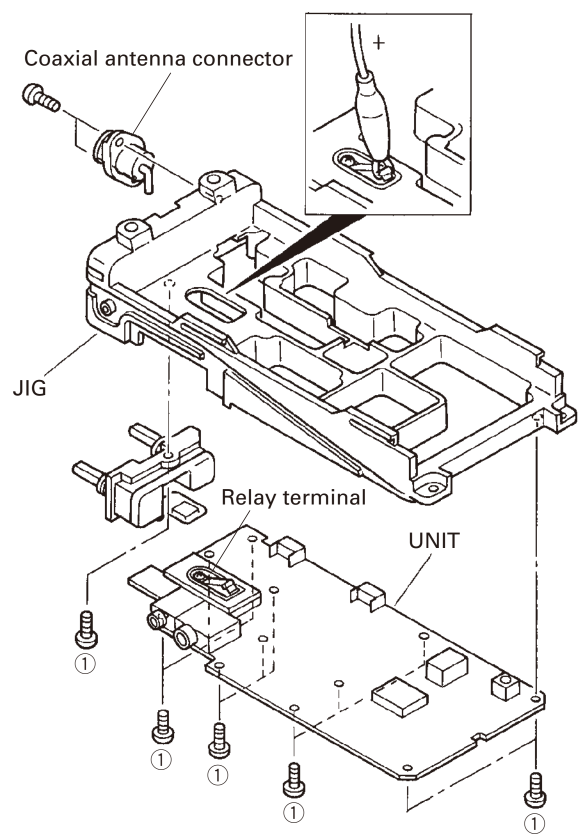
Use an antenna connector adapter [SMA(f) – BNC(f) or SMA(f) – N(f)] for adjustment. (The adapter is not provided as an option, so buy a commercially-available one.)

2. Jig (chassis) for adjustment(part number A10-1392-03)

■ Use the jig as follows:

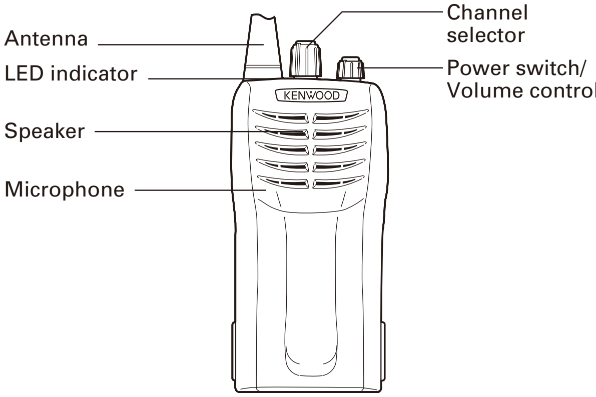
1. Insert the coaxial antenna connector into the jig.
2. Place the unit on the jig and fix it with 12 screws ①.
3. Solder the antenna terminal to the terminal of the unit.

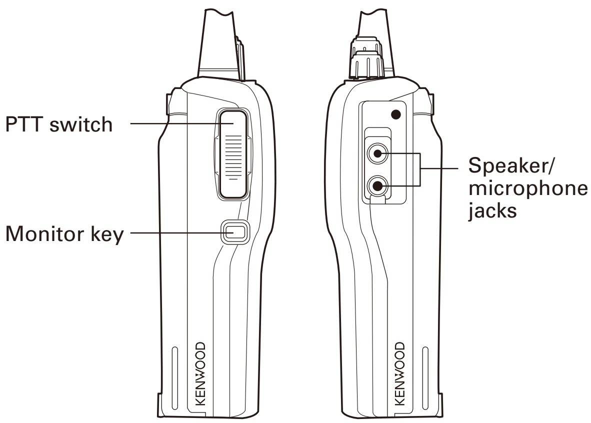
Note: Supply power from an external power supply.
(Relay terminal : +
Jig (chassis) : –)



ADJUSTMENT

Controls





Frequency

The set has been adjusted for the frequencies shown in the following table. When required, re-adjust them following the adjustment procedure to obtain the frequencies you want in actual operation.

■ Frequency

CH	K,M		K2,M2	
	RX (MHz)	TX (MHz)	RX (MHz)	TX (MHz)
1	460.10000	460.00000	480.10000	480.00000
2	450.10000	450.00000	470.10000	470.00000
3	469.90000	469.97500	489.90000	489.97500
4	460.30000	460.30000	480.50000	480.50000
5	460.35000	460.35000	480.55000	480.55000
6	469.40000	469.40000	480.60000	480.60000
7	460.35000	460.35000	480.55000	480.55000
8	460.45000	460.45000	480.65000	480.65000
9~16	-	-	-	-

Preparations for tuning the transceiver

Before attempting to tune the transceiver, connect the unit to a suitable power supply.

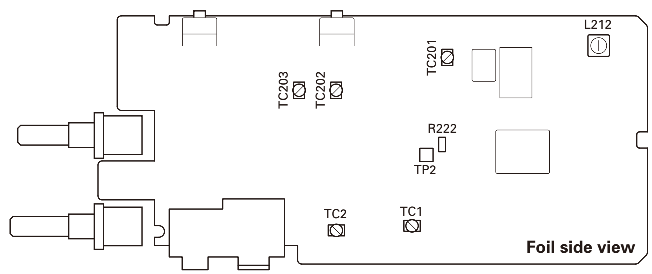
Whenever the transmitter is tuned, the unit must be connected to a suitable dummy load (i.e. power meter).

The speaker output connector must be terminated with a 8Ω dummy load and connected to an AC voltmeter and an audio distortion meter or a SINAD measurement meter at all times during tuning.

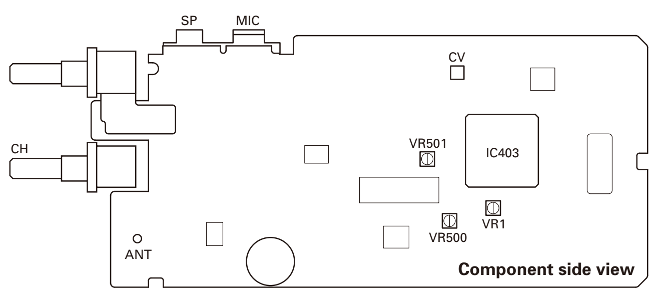
■ Adjustment Frequency

TEST CH	K,M		K2,M2	
	RX (MHz)	TX (MHz)	RX (MHz)	TX (MHz)
Low	450.10000	450.00000	470.10000	470.00000
Center	460.10000	460.00000	480.10000	480.00000
High	469.90000	469.97500	489.90000	489.97500

Adjustment Points



TC201, TC202, TC203:
Band-pass filter waveform adjustment
L212: AF level adjustment
TC1: Transmit VCO lock voltage adjustment
TC2: Receive VCO lock voltage adjustment
TP2: Band-pass filter test point



ANT: Antenna connector
CH: Channel selector
SP: Speaker jack
MIC: Microphone jack
CV: VCO lock voltage adjustment terminal
VR500: DQT waveform adjustment
VR501: MAX DEV adjustment

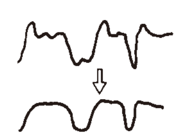
Note: To fine tune the frequency when not using a computer, adjust VR1.

ADJUSTMENT

Common Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) BATT terminal voltage: 7.5V 2) SSG standard modulation [Wide] MOD: 1kHz,DEV: 3kHz [Narrow] MOD: 1kHz,DEV: 1.5kHz							
2. VCO lock voltage RX	1) TEST CH: High	Power meter DVM	TX-RX	ANT CV	TX-RX	TC2	3.7V	±0.1V
	2) TEST CH: Low						Check	1.0V or more
3. VCO lock voltage TX	1) TEST CH: High PTT: ON				TX-RX	TC1	3.7V	±0.1V
	2) TEST CH: Low PTT: ON						Check	1.0V or more

Transmitter Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Frequency adjust	1) TEST CH: Center PTT: ON	Frequency counter	TX-RX	ANT		Programming software: KPG-55D (Windows version: ver.4.00 or later)	Center frequency ±50Hz	Note: After replacing the TCXO (X1) align frequency.
2. DQT/QT Balance	1) TEST CH: Center PTT: ON	Power meter Deviation meter Oscilloscope			TX-RX	VR500	Adjust the demodulation wave into a square wave.	
3. RF Power	1) TEST CH: Low BATT terminal voltage: 7.5V PTT: ON	Power meter Ammeter				Programming software: KPG-55D (Windows version: ver.4.00 or later)	4.1W	±0.1W 1.8A or less
4. Max Deviation [Wide]	1) TEST CH: Center AG: 1kHz/120mV Deviation meter filter LPF: 15kHz HPF: OFF PTT: ON	Power meter Deviation meter Oscilloscope AG AF VTVM		ANT SP/MIC connector	TX-RX	VR501	4.2kHz (According to the larger +,-)	±0.1kHz
[Narrow]	2) TEST CH: Center PTT: ON						Check	±1.8kHz~2.2kHz

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
5. MIC Sensitivity [Wide]	1) TEST CH: Center AG: 1kHz/12mV PTT: ON	Power meter Deviation meter Oscillo-scope AG AF VTVM	TX-RX	ANT SP/MIC connec-tor			Check	±2.2kHz~3.8kHz
[Narrow]	2) TEST CH: Center PTT: ON							±1.1kHz~1.9kHz
6. QT Deviation [Wide]	1) TEST CH: High QT: 67.0Hz LPF: 3kHz HPF: OFF PTT: ON	Power meter Deviation meter Oscillo-scope AG AF VTVM		ANT		Program-ming software: KPG-55D (Windows version: ver.4.00 or later)	0.75kHz	±0.03kHz
[Narrow]	2) TEST CH: High PTT: ON						0.35kHz	±0.03kHz
7. DQT Deviation [Wide]	1) TEST CH: High DQT: D023N LPF: 3kHz HPF: OFF PTT: ON						0.65kHz	±0.03kHz
[Narrow]	2) TEST CH: High PTT: ON						0.30kHz	±0.03kHz
8. Battery Warning Level	1) BATT terminal voltage: 5.8V	DVM		ANT BATT termi-nal			Adjust the adjust-ment value until the LED starts to blink.	The LED must blink.

ADJUSTMENT

Receiver Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. BPF wave adjust TK-3102G (K,M)	1) TEST CH: Center Spectrum analyzer setting Center frequency: 460MHz Span: 100MHz RBW: 100kHz VBW: 10kHz ATT: 0dB REF: -20dBm TG level: -40dBm	Spectrum analyzer Tracking generator	TX-RX	ANT TP2	TX-RX	TC201 TC202 TC203	Adjust the waveform as shown in Fig.1.	
TK-3102G (K2,M2)	2) TEST CH: Center Spectrum analyzer setting Center frequency: 480MHz Span: 100MHz RBW: 100kHz VBW: 10kHz ATT: 0dB REF: -20dBm TG level: -40dBmv							
2. AF Level [Wide]	1) TEST CH: Center SSG output: -53dBm (501μV) SSG MOD: 3kHz	SSG Oscillo-scope AF VTVM Distortion meter		ANT SP/MIC connec-tor		L212	Adjust to the maxi-mum AF level.	
[Narrow]	2) TEST CH: Center SSG output: -53dBm (501μV) SSG MOD: 1.5kHz							
3. Sensitivity [Wide]	1) TEST CH: Low,Center,High SSG output: -116dBm (0.35μV) SSG MOD: 3kHz						Check	12dB SINAD or more
[Narrow]	2) TEST CH: Center SSG output: -116dBm (0.35μV) SSG MOD: 1.5kHz							
4. Squelch Tight	1) TEST CH: Center MONI: ON					Program-ming software: KPG-55D (Windows version: ver.4.00 or later)	Adjust the adjust-ment value until the squelch closes.	The squelch must close.
	2) Level 9 SSG output: -117dBm (0.32μV) SSG MOD: 3.0kHz							
5. Squelch Open	1) TEST CH: Center MONI: ON							
	2) Level 3 SSG output: -125dBm (0.126μV) SSG MOD: 3.0kHz							

BPF-Wave

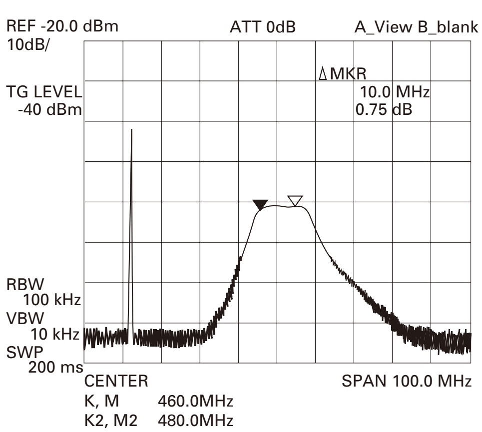
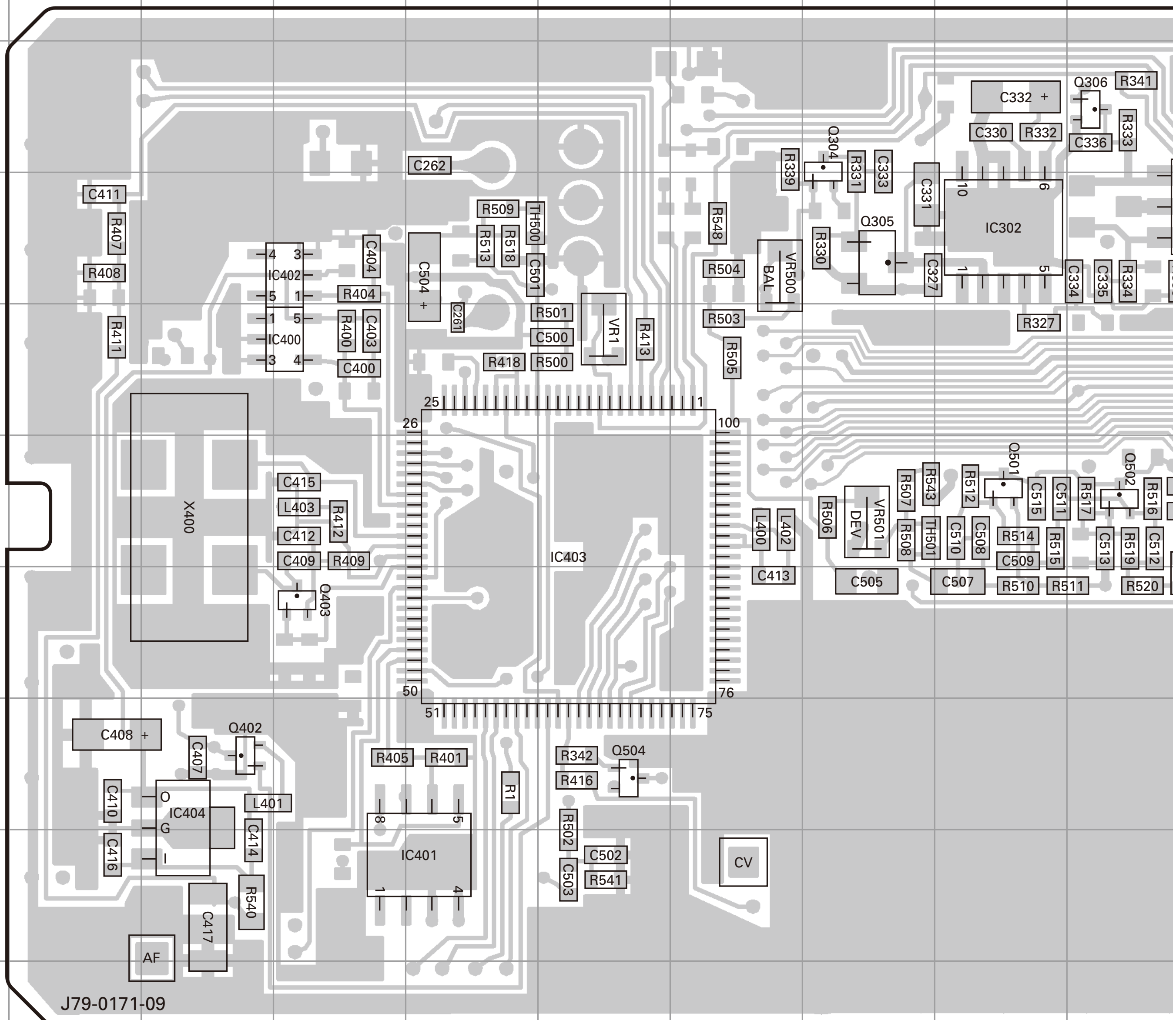


Fig. 1

TK-3102G PC BOARD

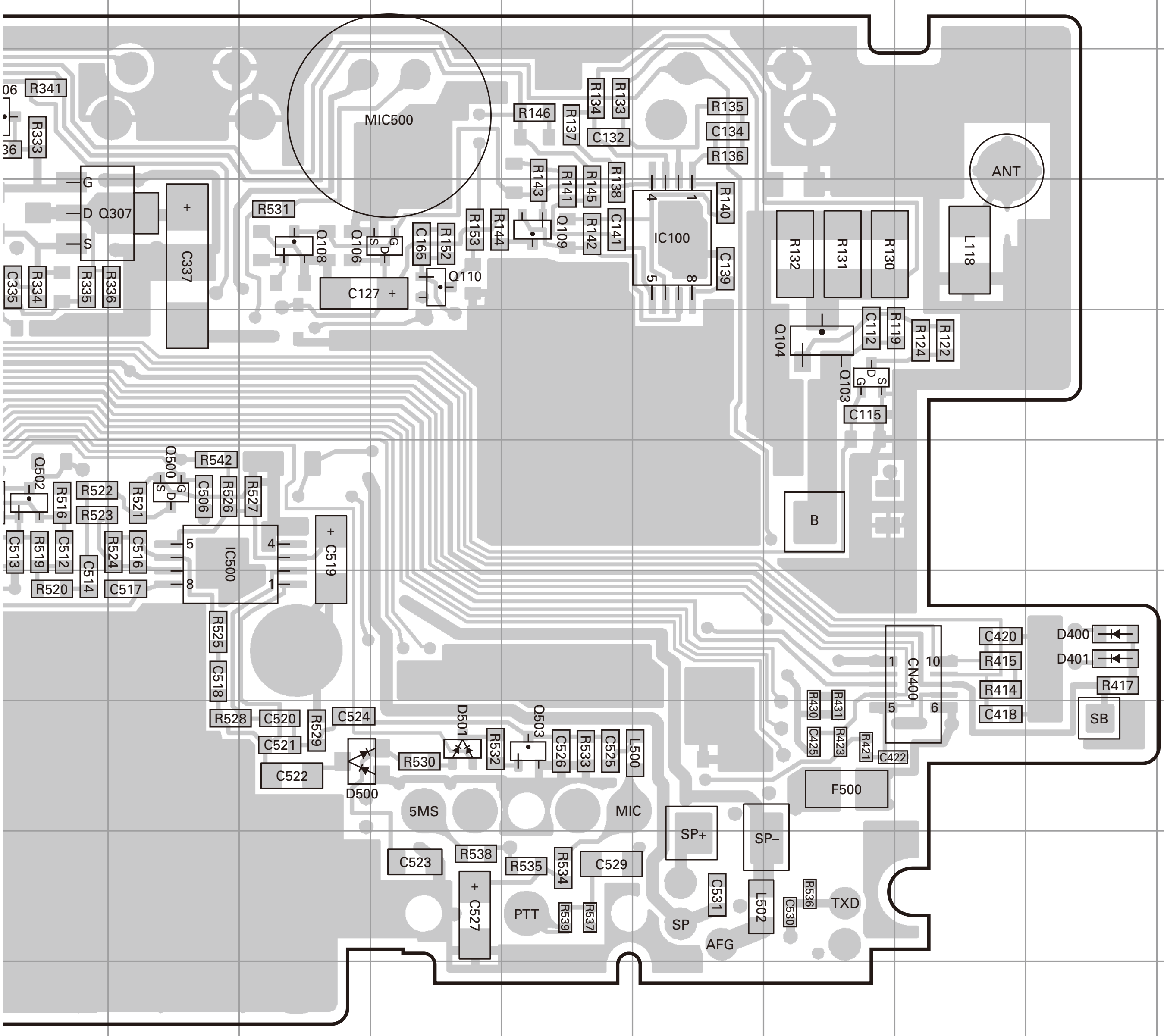
TX-RX UNIT (X57-6030-XX) -10 : K,M -11 : K2,M2
Component side view (J79-0171-09)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC100	4O	Q106	4M	Q500	6K
IC302	4I	Q108	4L	Q501	6I
IC400	5D	Q109	4N	Q502	6J
IC401	9E	Q110	4M	Q503	8N
IC402	4D	Q304	3H	Q504	8F
IC403	6F	Q305	4H	D400	7R
IC404	8C	Q306	3J	D401	7R
IC500	6K	Q307	4K	D500	8L
Q103	5P	Q402	8C	D501	8M
Q104	5P	Q403	7D		

PC BOARD TK-3102G

TX-RX UNIT (X57-6030-XX) -10 : K,M -11 : K2,M2
Component side view (J79-0171-09)



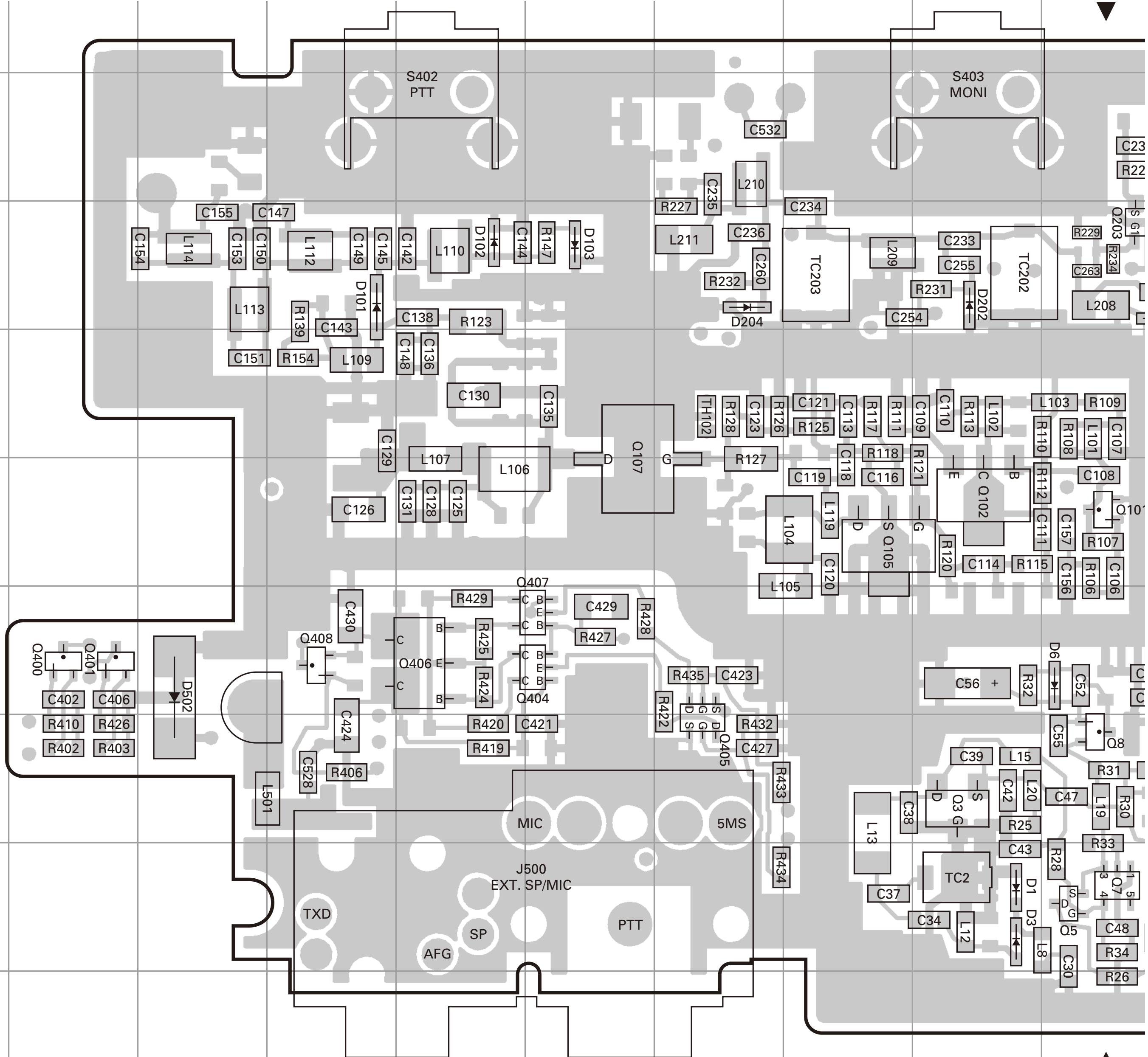
Component side

Layer 1	
Layer 2	
Layer 3	
Layer 4	

Foil side

TK-3102G PC BOARD

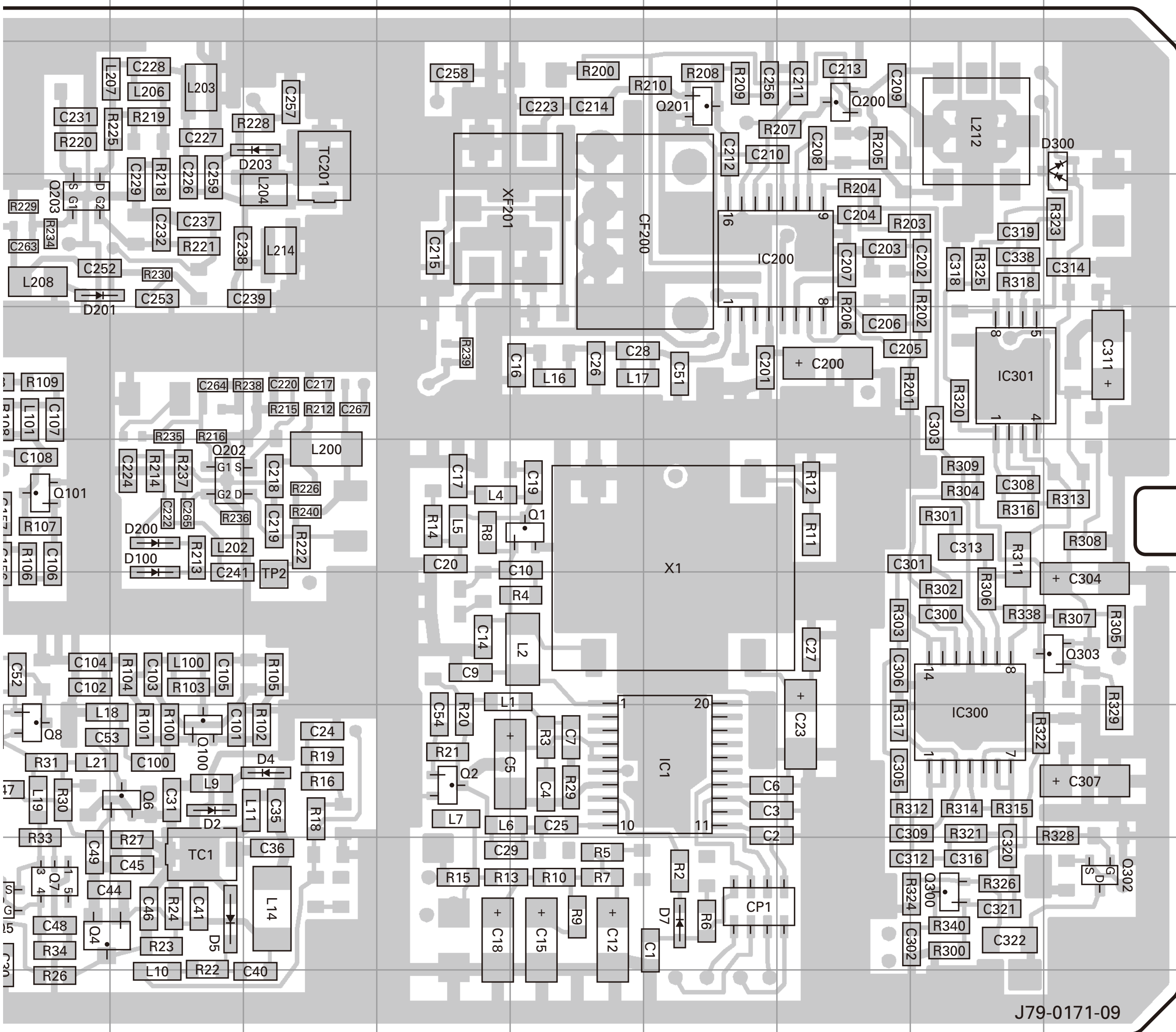
TX-RX UNIT (X57-6030-XX) -10 : K,M -11 : K2,M2
Foil side view (J79-0171-09)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	8O	Q7	9J	Q203	4J	Q408	7D	D102	4E
IC200	4O	Q8	8J	Q300	9Q	D1	9I	D103	4F
IC300	8Q	Q100	8K	Q302	9R	D2	8K	D200	6K
IC301	5Q	Q101	6J	Q303	7R	D3	9I	D201	4J
Q1	6N	Q102	6I	Q400	7B	D4	8L	D202	4I
Q2	8M	Q105	6H	Q401	7B	D5	9K	D203	3L
Q3	8I	Q107	6F	Q404	7F	D6	7J	D204	4G
Q4	9J	Q200	3P	Q405	8G	D7	9O	D300	3R
Q5	9J	Q201	3O	Q406	7E	D100	6K	D502	7C
Q6	8K	Q202	6K	Q407	7F	D101	4D		

PC BOARD TK-3102G

TX-RX UNIT (X57-6030-XX) -10 : K,M -11 : K2,M2
Foil side view (J79-0171-09)



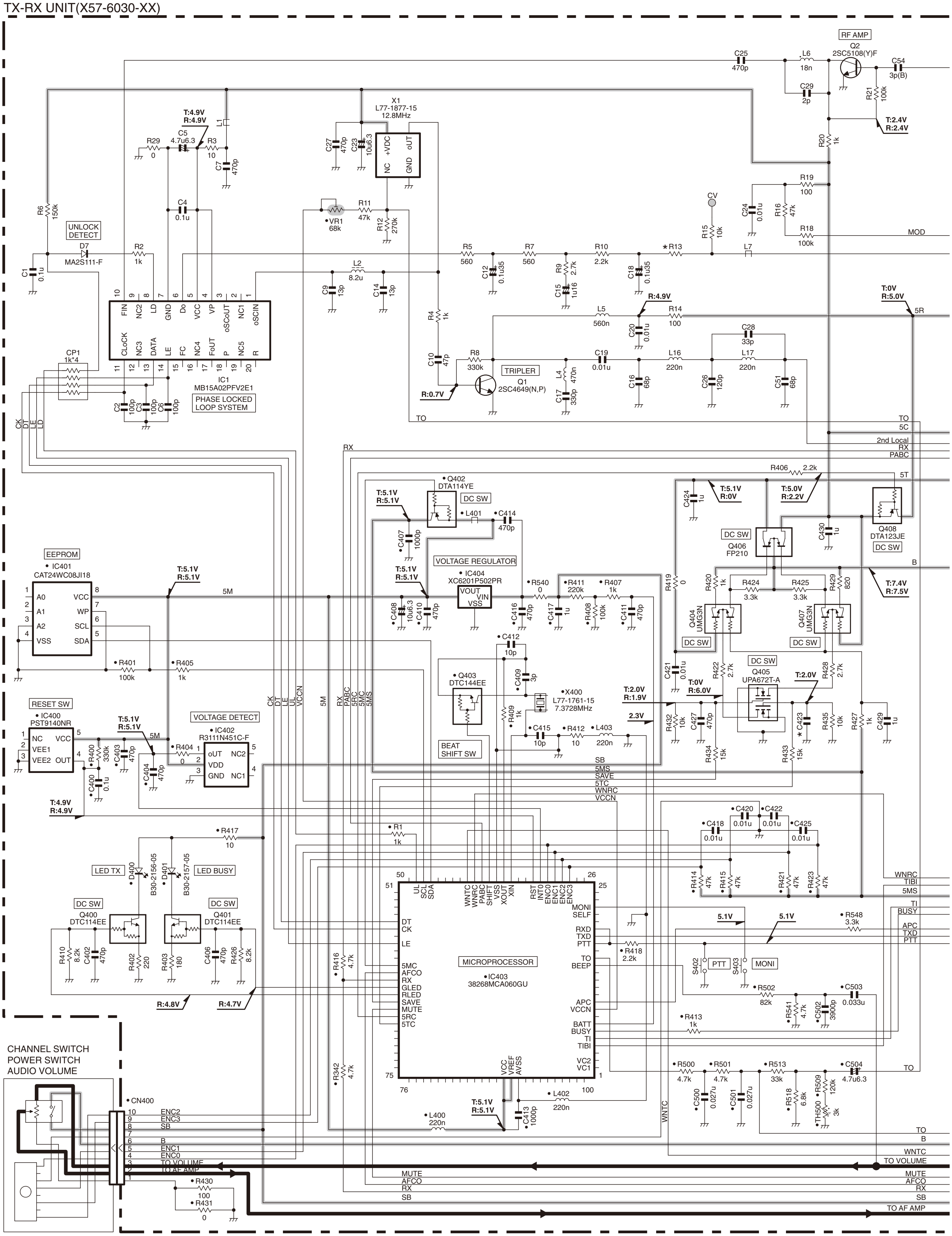
Component side

Layer 1
Layer 2
Layer 3
Layer 4

Foil side

TK-3102G SCHEMATIC DIAGRAM

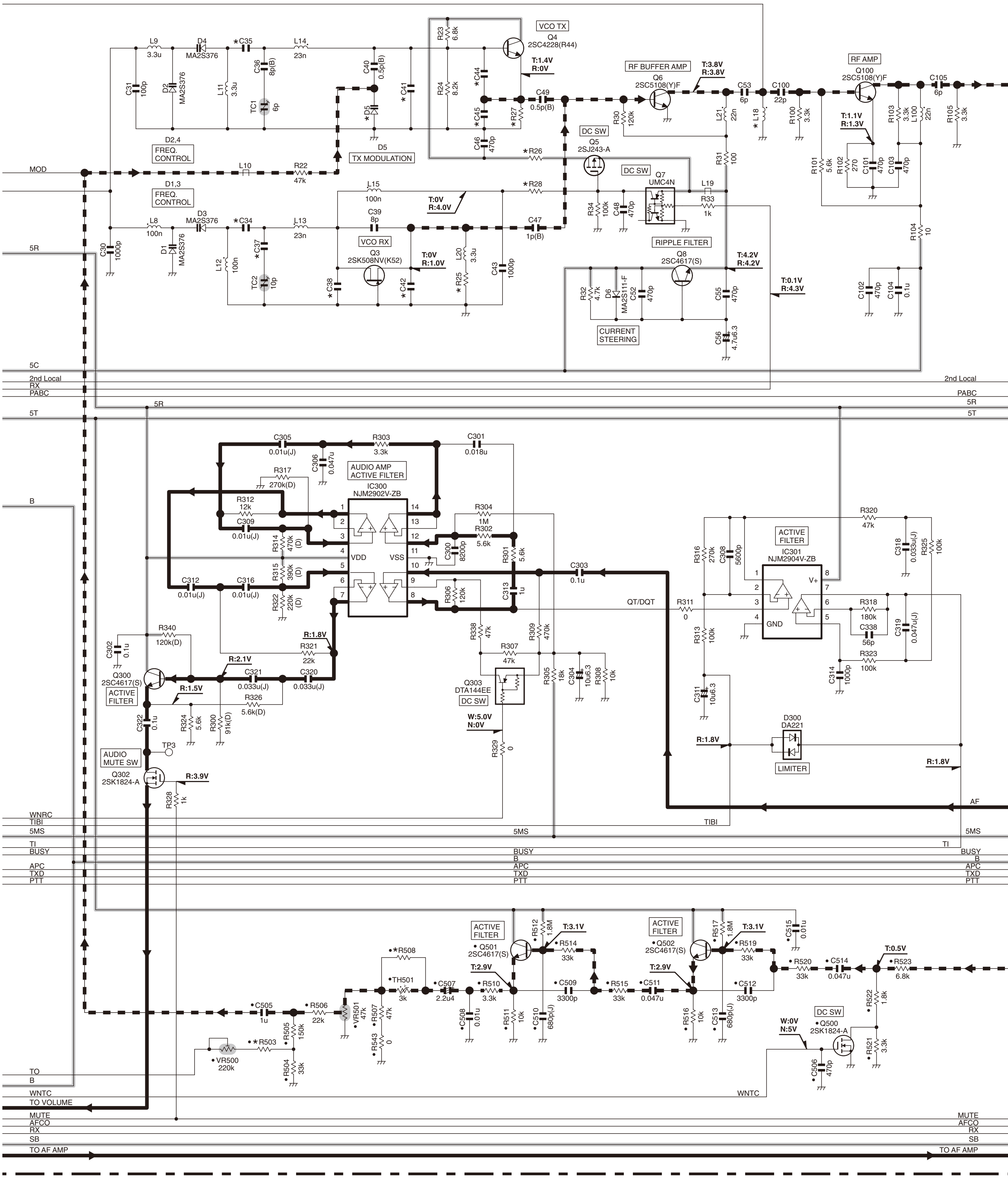
TX-RX UNIT(X57-6030-XX)



X57-6030-XX	R13	C423
-10	K,M	0	0.033u
-11	K2,M2	220	0.1u

SCHEMATIC DIAGRAM TK-3102G

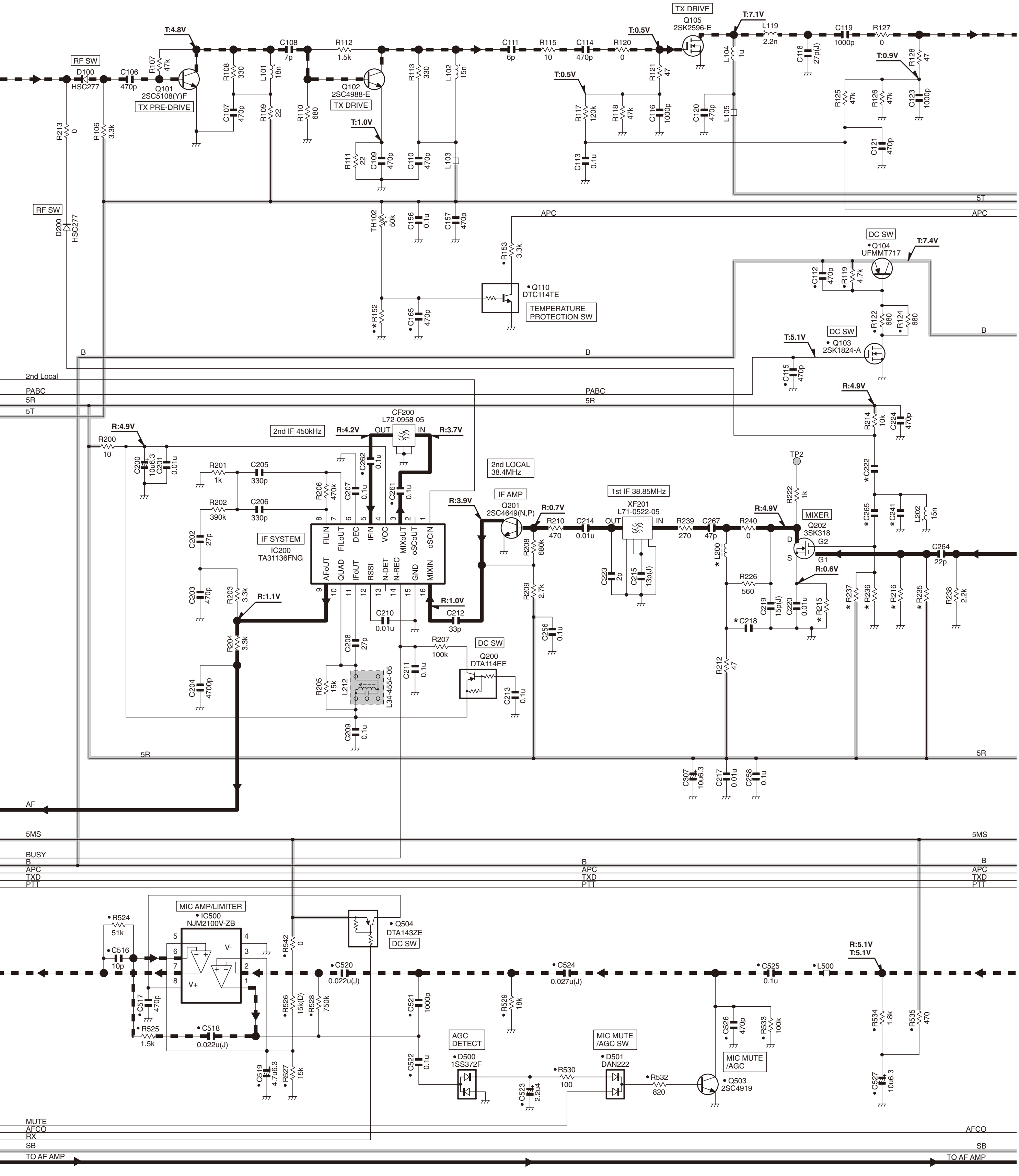
TX-RX UNIT(X57-6030-XX)



X57-6030-XX		D5	L18	R25	R26	R27	R28	R503	R508	C34	C35	C37	C38	C41	C42	C44	C45
-10	K,M	MA360	47n	100	100	330	22	68k	5.6k	18p(J)	7p	33p	5p	4p	10p(D)	6p	10p(C)
-11	K2,M2	1SV214-F	NO	150	220	470	82	18k	2.2k	33p(J)	6p(B)	15p(J)	2p(B)	5p(B)	13p(J)	5p(B)	6p(B)

TK-3102G SCHEMATIC DIAGRAM

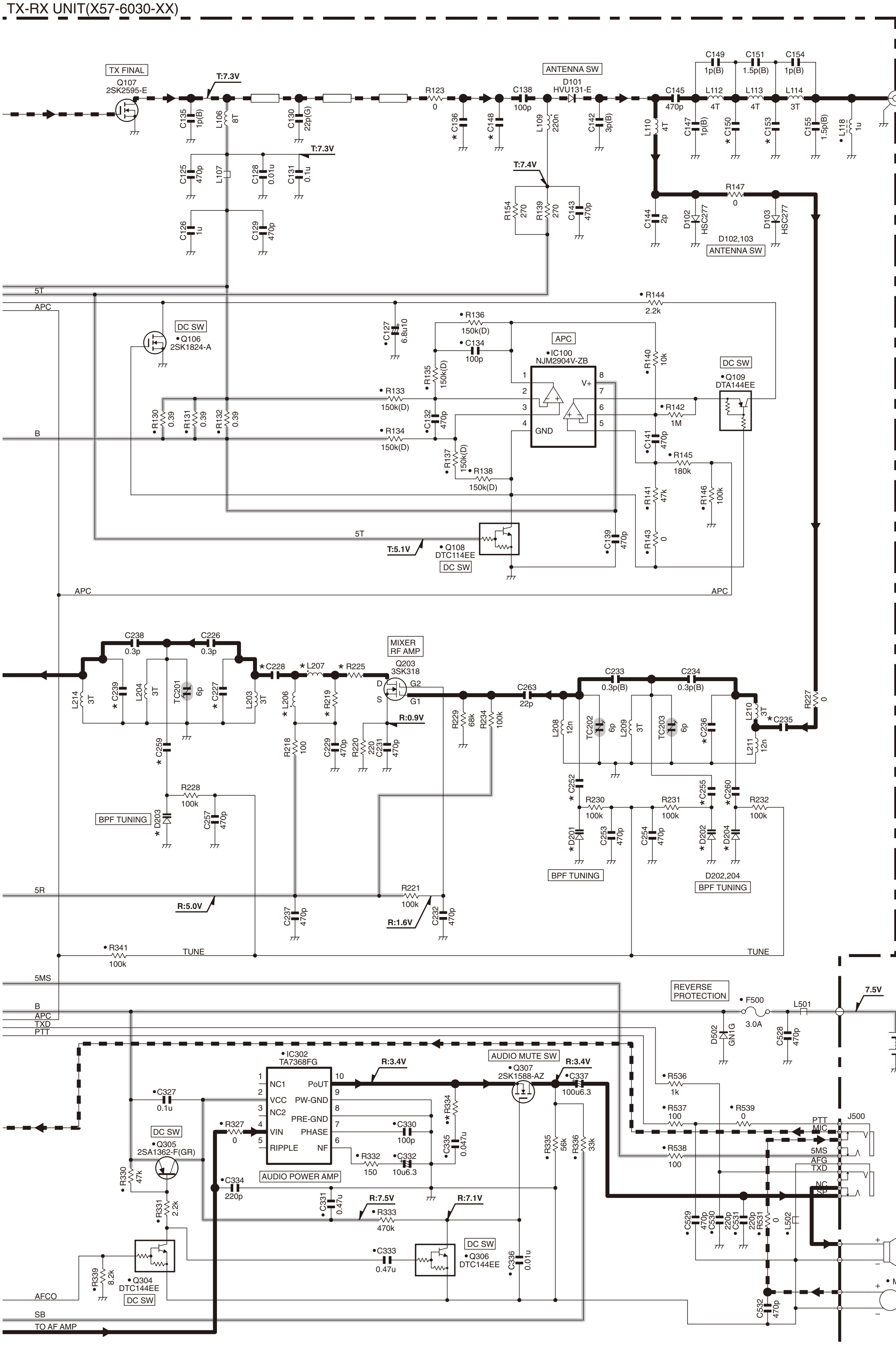
TX-RX UNIT(X57-6030-XX)



X57-6030-XX	L200	R152	R215	R216	R235	R236	R237	C218	C222	C241	C265
-10	K,M	1u	390	150	56k	100k	56k	100k	470p	1p	6p	470p
-11	K2,M2	820n	330	270	10k	15k	10k	18k	0.01u	3p(B)	2.5p(B)	47p

SCHEMATIC DIAGRAM TK-3102G

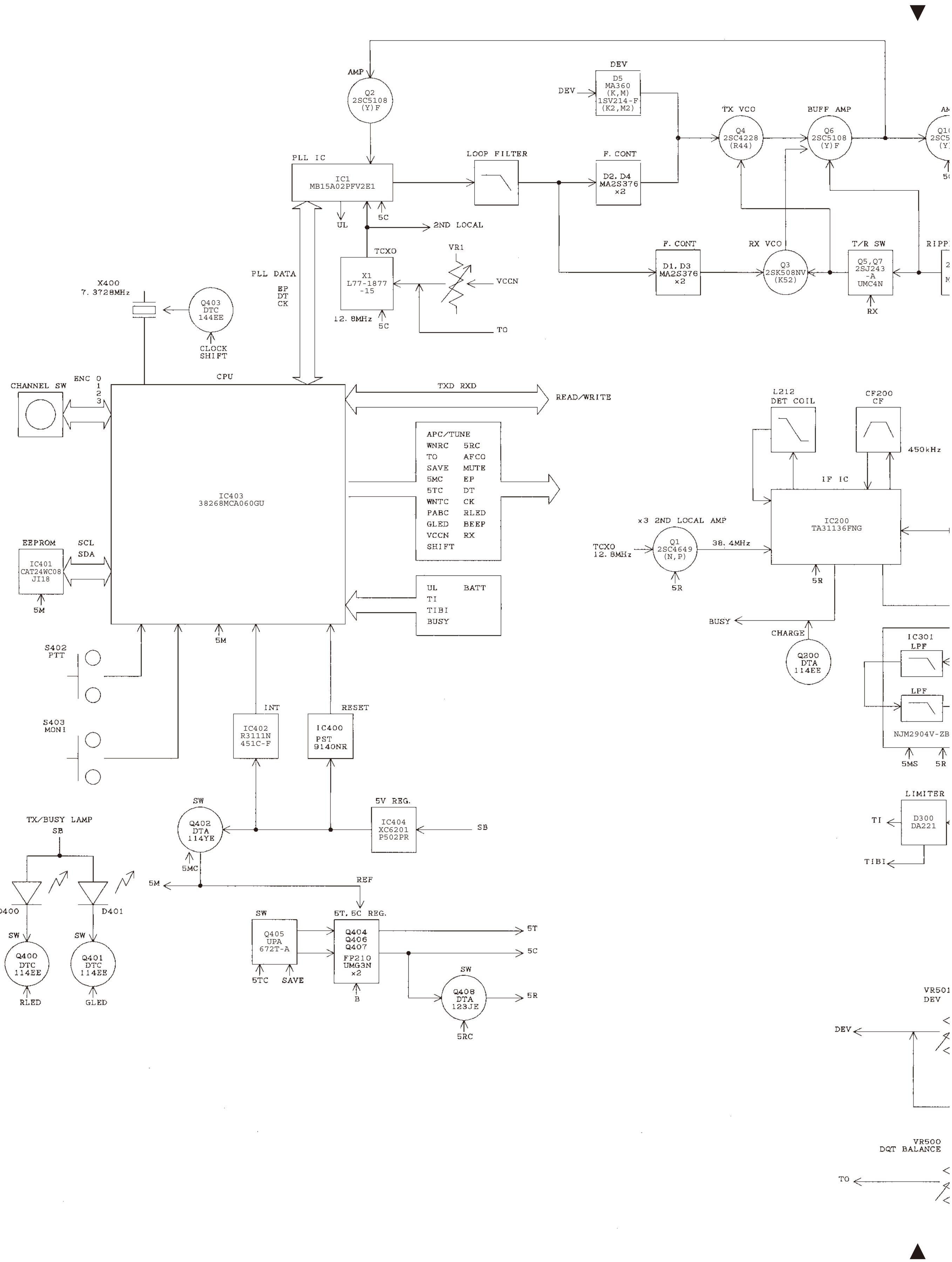
TX-RX UNIT(X57-6030-XX)



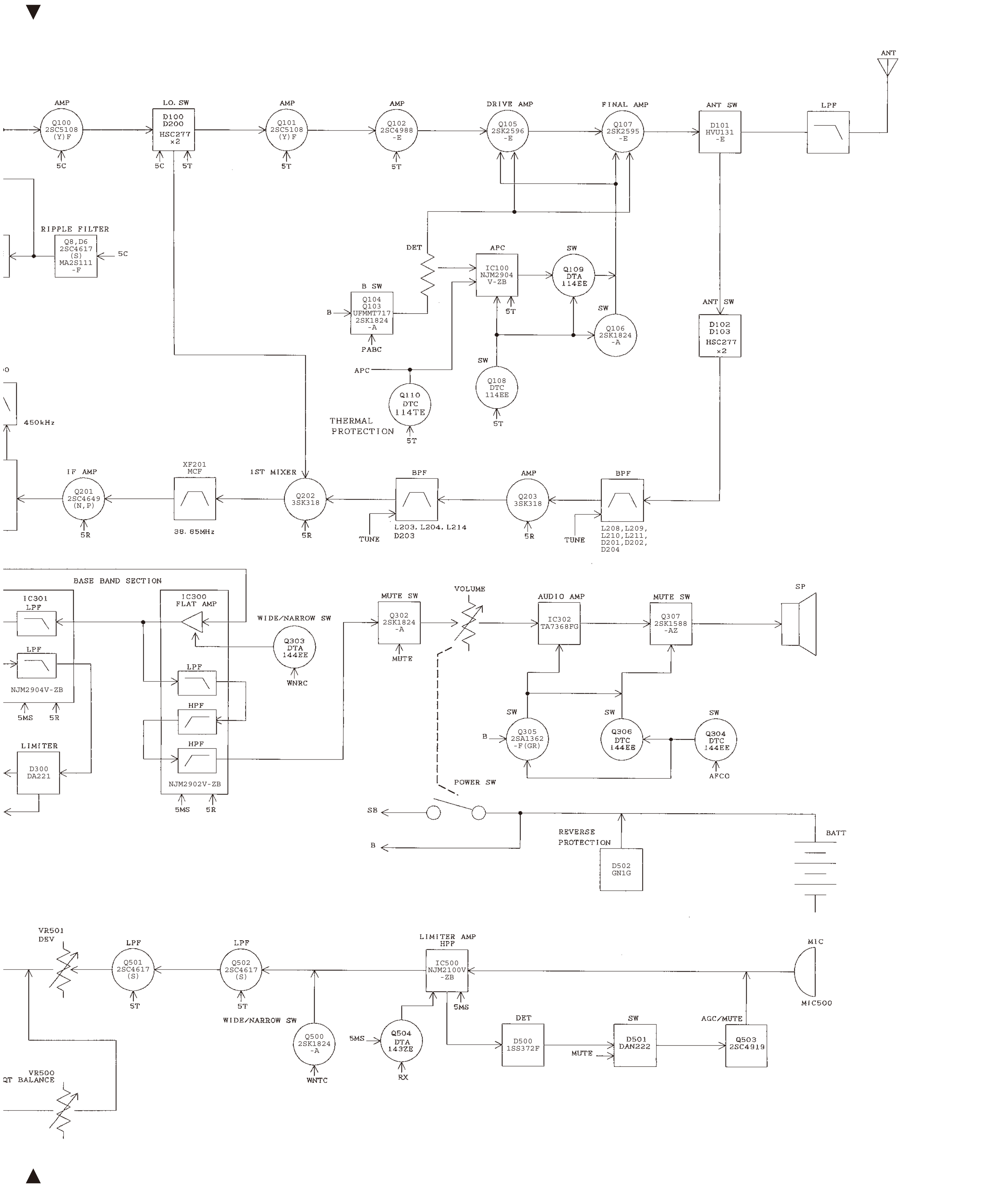
X57-6030-XX		D201	D202	D203	D204	L206	L207	R219	R225	R334	C136	C148	C150	C153	C227	C228	C235	C236	C239	C252	C255	C259	C260
-10	K,M	HVC350B	HVC350B	HVC350B	HVC350B	15n	27n	3.3k	10	10	7p(B)	1p	5p	3p	10p	27p(J)	3.5p(B)	0.3p(B)	4p	4.5p	4.5p(B)	3p	2.5p(B)
-11	K2,M2	HVC355B	HVC355B	HVC355B	HVC355B	18n	33n	2.2k	0	15	6p(B)	NO	4.5p(B)	2.5p(B)	7p(B)	8p(B)	4p(B)	NO	2p(B)	3.5p(B)	3.5p(B)	4p(B)	3p(B)

Note : The components marked with a dot (•) are parts of layer 1.

BLOCK DIAGRAM

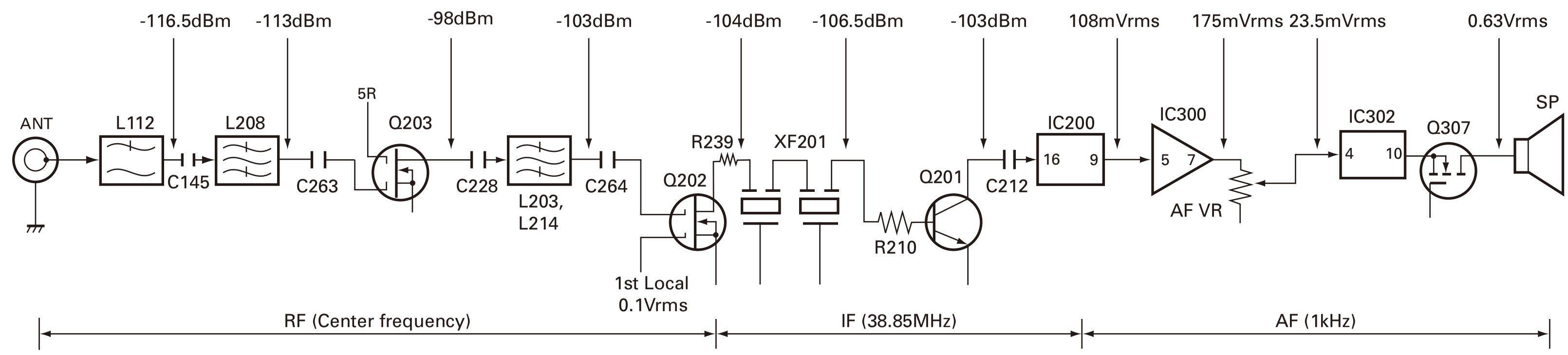


BLOCK DIAGRAM



LEVEL DIAGRAM

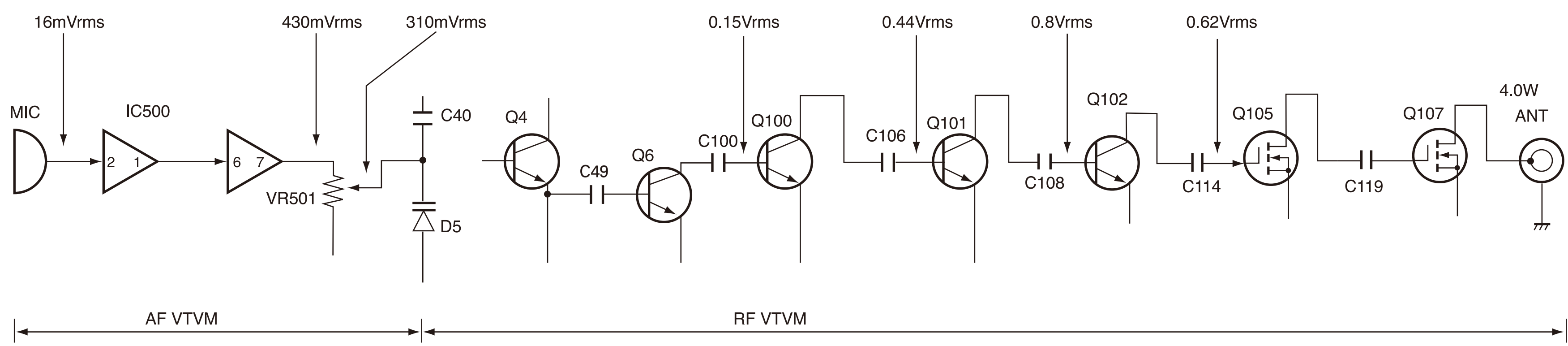
Receiver Section



SG output level for obtaining 12dB / SINAD when injected to each point through a 470pF coupling capacitor.
Measure the 1st Local level on a RF VTVM.

Modulate the AF level with a frequency of 1kHz and deviation of 1.5kHz (Narrow), 3kHz (Wide). Then take the signal from the signal generator output when set to -53dBm and obtain the level shown on an AF VTVM when the AF output has been adjusted to 0.63Vrms with the AF vol.

Transmitter Section

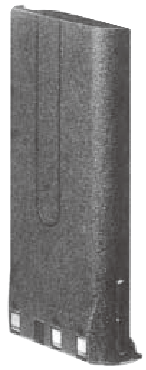


Measure the audio frequency on an AF VTVM and radio frequency on a RF VTVM at high impedance.
Set the MIC input to obtain a modulation factor of 60% with the transmit frequency at center and a modulation frequency of 1kHz.

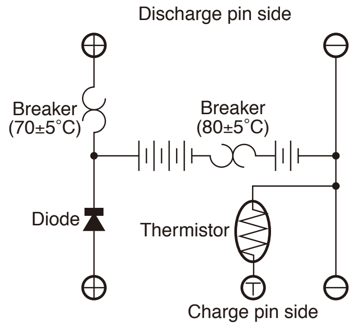
OPTIONAL ACCESSORIES

KNB-14 (Ni-Cd BATTERY)

■ **External View**



■ **Schematic Diagram**



■ **Specifications**

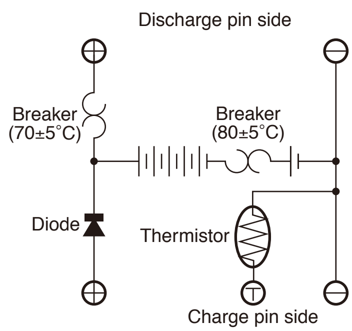
Voltage : 7.2V (1.2V x 6)
Capacity : 600mAh
Dimensions : 60.8W x 110.8H x 17.3D (mm)
(projections included)
Charger and charging time:
KSC-15 (normal charger), approximately 8 hours
KSC-16 (rapid charger), approximately 1 hour
KSC-24 (rapid charger), approximately 40 minutes
Weight : 165g

KNB-15A (Ni-Cd BATTERY)

■ **External View**



■ **Schematic Diagram**



■ **Specifications**

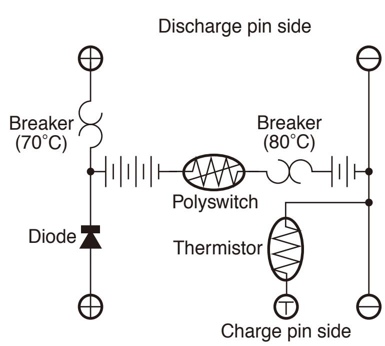
Voltage : 7.2V (1.2V x 6)
Capacity : 1100mAh
Dimensions : 60.8W x 110.8H x 20.3D (mm)
(projections included)
Charger and charging time:
KSC-15 (normal charger), approximately 8 hours
KSC-16 (rapid charger), approximately 2 hours
KSC-24 (rapid charger), approximately 1 hour
Weight : 210g

KNB-20N (Ni-MH BATTERY)

■ **External View**



■ **Schematic Diagram**



■ **Specifications**

Voltage : 7.2V (1.2V x 6)
Capacity : 1600mAh
Dimensions : 63.8W x 110.8H x 17.2D (mm)
(projections included)
Charger and charging time:
KSC-24 (rapid charger), approximately 80 minutes
Weight : 210g

SPECIFICATIONS

GENERAL

Frequency range	450 ~ 470MHz(K,M) 470 ~ 490MHz (K2,M2)
Channels	16 channels
Channel spacing	Wide: 25kHz Narrow: 12.5kHz
PLL channel stepping	5kHz, 6.25kHz
Battery voltage	7.5V DC ±20%
Battery life (5-5-90 duty cycle)	
with KNB-15A (1100mAh battery)	More than 8 hours
Operating temperature range	–30°C ~ +60°C (–22 °F ~ +140°F)
Frequency stability	±0.00025% (–30°C ~ +60°C)
Antenna impedance	50Ω
Channel frequency spread	20MHz
Dimensions (W x H x D)	
(Projections not included)	
with KNB-15A (1100mAh battery)	58 x 126.2 x 34.6 mm (2.28 x 4.97 x 1.36 inches)
Weight (net)	380g (13.4 oz) with battery (KNB-15A), antenna and belt clip

RECEIVER

Sensitivity (12dB SINAD)	Wide: 0.25μV Narrow: 0.28μV
Selectivity	Wide: 70dB Narrow: 60dB
Intermodulation distortion	Wide: 65dB Narrow: 60dB
Spurious response	60dB
Audio output	500mW with less than 10% distortion

TRANSMITTER

RF power output	4W
Spurious response	65dB
Modulation	Wide: 16K0F3E Narrow: 11K0F3E
FM noise	Wide: 45dB Narrow: 40dB
Audio distortion	Less than 5%

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Kenwood Ibérica, S.A.

Bolivia, 239-08020 Barcelona, Spain

Kenwood Electronics Australia Pty. Ltd.

(A.C.N. 001 499 074)
16 Giffnock Avenue, Centrecourt Estate, North Ryde, N.S.W. 2113 Australia

Kenwood Electronics (Hong Kong) Ltd.

Unit 3712-3724, Level 37, Tower one Metroplaza, 223 Hing Fong Road, Kwai Fong, N.T., Hong Kong

Kenwood Electronics Singapore Pte Ltd

1 Ang Mo Kio Street 63, Singapore 569110

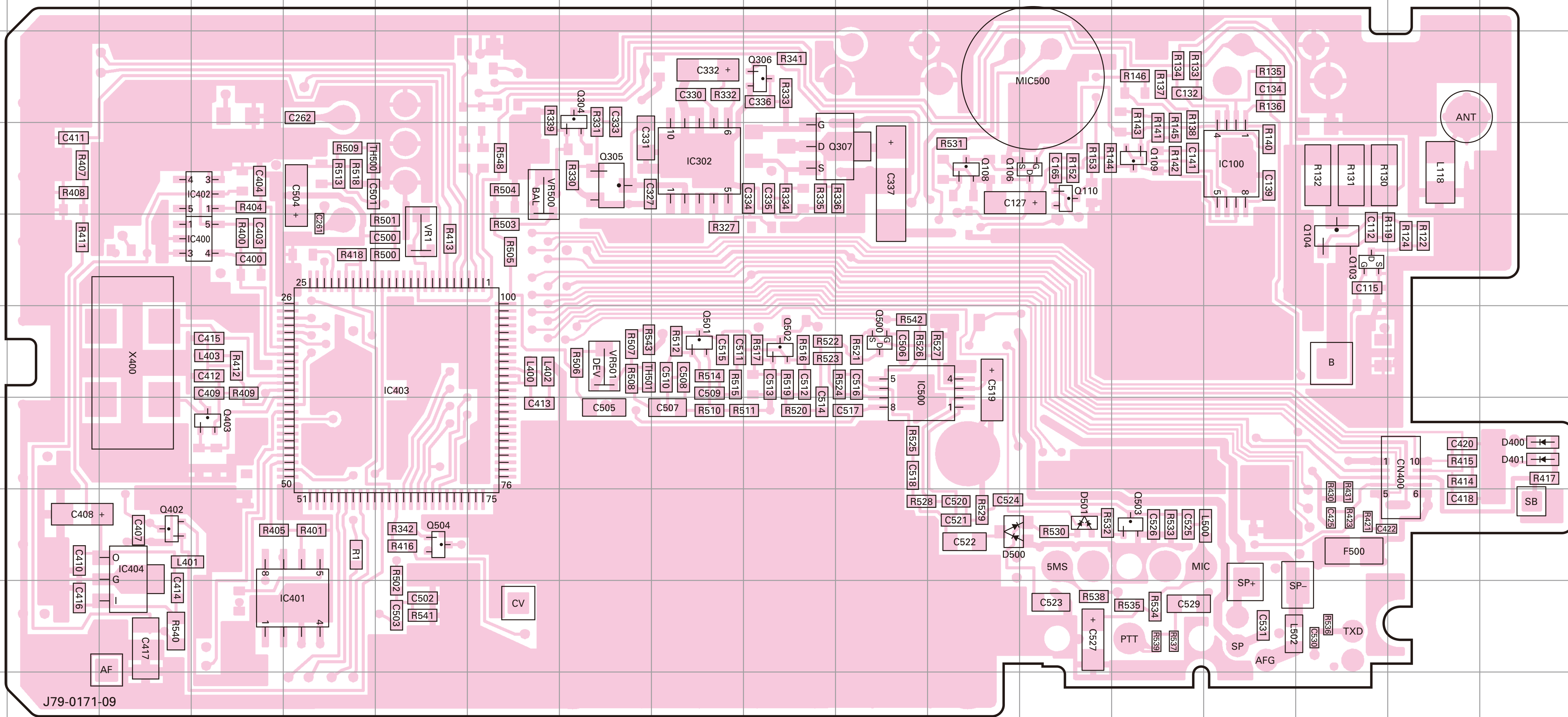
25%

TK-3102G PC BOARD

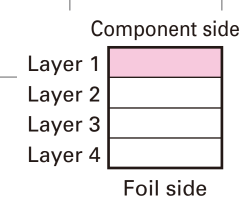
PC BOARD TK-3102G

TX-RX UNIT (X57-6030-XX) -10 : K,M -11 : K2,M2
Component side view (J79-0171-09)

TX-RX UNIT (X57-6030-XX) -10 : K,M -11 : K2,M2
Component side view (J79-0171-09)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC100	4O	Q106	4M	Q500	6K
IC302	4I	Q108	4L	Q501	6I
IC400	5D	Q109	4N	Q502	6J
IC401	9E	Q110	4M	Q503	8N
IC402	4D	Q304	3H	Q504	8F
IC403	6F	Q305	4H	D400	7R
IC404	8C	Q306	3J	D401	7R
IC500	6K	Q307	4K	D500	8L
Q103	5P	Q402	8C	D501	8M
Q104	5P	Q403	7D		

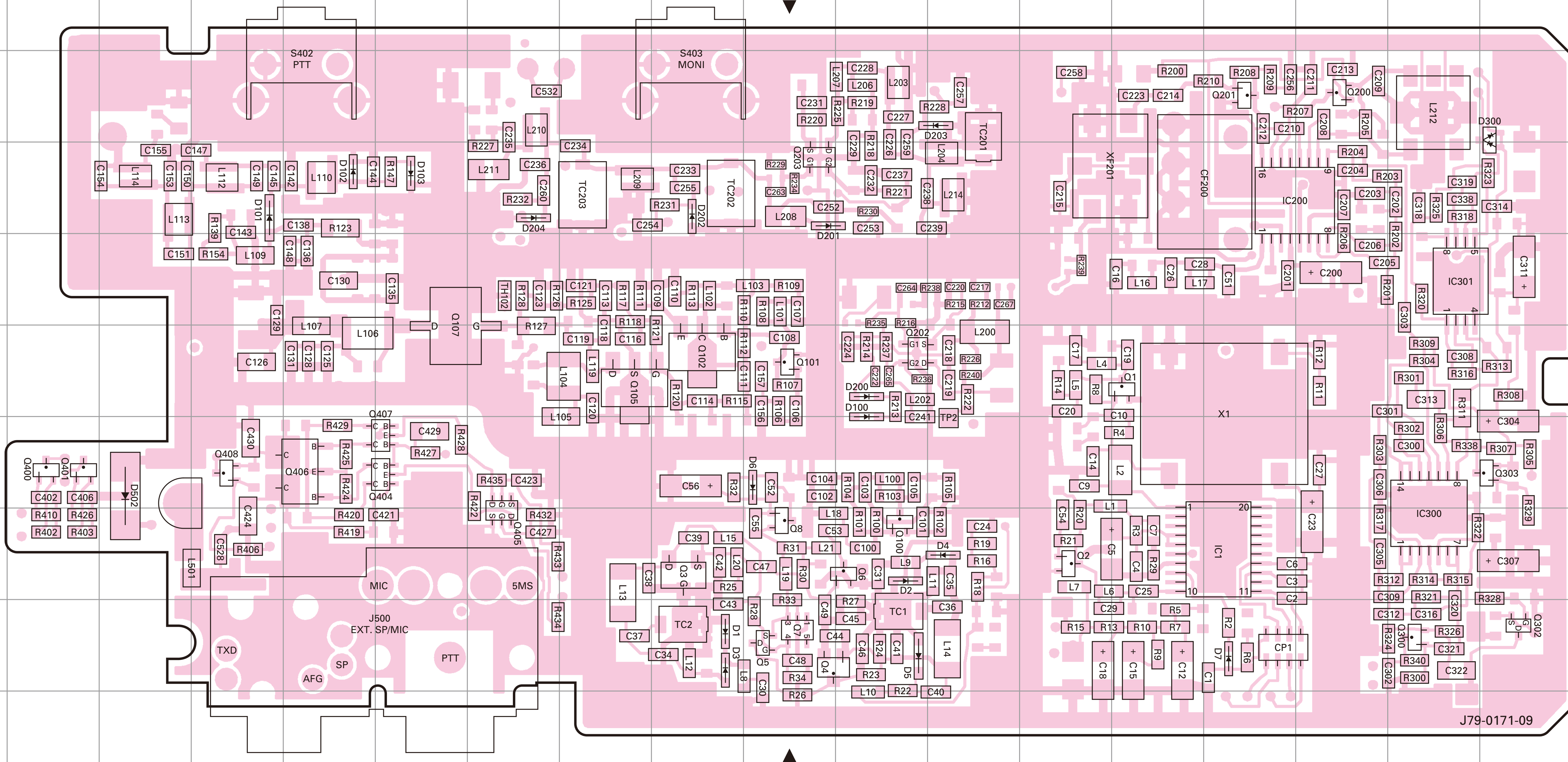


TK-3102G PC BOARD

PC BOARD TK-3102G

TX-RX UNIT (X57-6030-XX) -10 : K,M -11 : K2,M2
Foil side view (J79-0171-09)


TX-RX UNIT (X57-6030-XX) -10 : K,M -11 : K2,M2
Foil side view (J79-0171-09)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	8O	Q7	9J	Q203	4J	Q408	7D	D102	4E
IC200	4O	Q8	8J	Q300	9Q	D1	9I	D103	4F
IC300	8Q	Q100	8K	Q302	9R	D2	8K	D200	6K
IC301	5Q	Q101	6J	Q303	7R	D3	9I	D201	4J
Q1	6N	Q102	6I	Q400	7B	D4	8L	D202	4I
Q2	8M	Q105	6H	Q401	7B	D5	9K	D203	3L
Q3	8I	Q107	6F	Q404	7F	D6	7J	D204	4G
Q4	9J	Q200	3P	Q405	8G	D7	9O	D300	3R
Q5	9J	Q201	3O	Q406	7E	D100	6K	D502	7C
Q6	8K	Q202	6K	Q407	7F	D101	4D		

Component side
Layer 1
Layer 2
Layer 3
Layer 4
Foil side

TX-RX UNIT(X57-6030-XX)

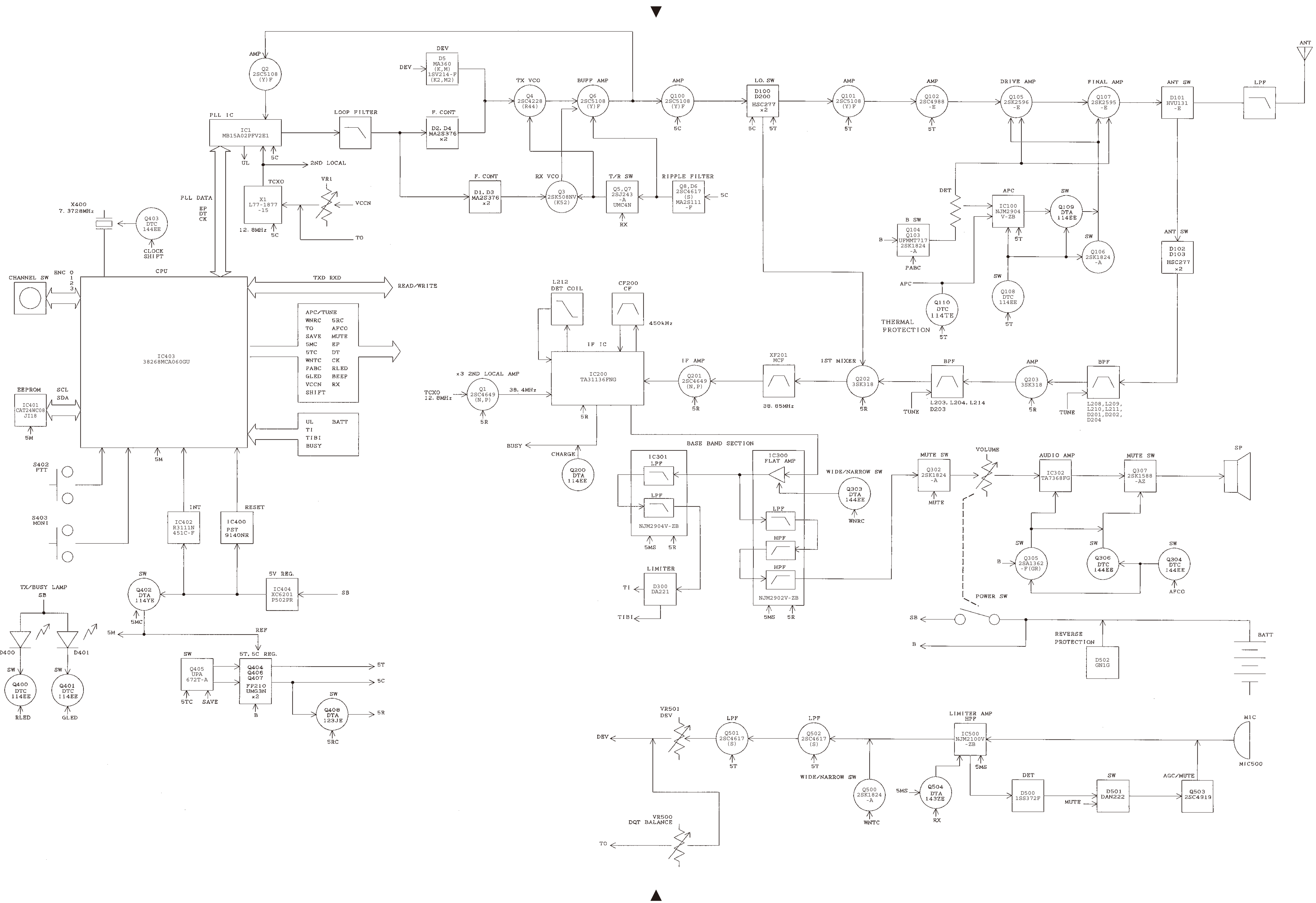


X57-6030-XX		R13	C423
-10	K,M	0	0.033u
-11	K2,M2	220	0.1u

X57-6030-XX		D5	L18	R25	R26	R27	R28	R503	R508	C34	C35	C37	C38	C41	C42	C44	C45
-10	K,M	MA360	47n	100	100	330	22	68k	5.6k	18p(J)	7p	33p	5p	4p	10p(D)	6p	10p(C)
-11	K2,M2	1SV214-F	NO	150	220	470	82	18k	2.2k	33p(J)	6p(B)	15p(J)	2p(B)	5p(B)	13p(J)	5p(B)	6p(B)

X57-6030-XX		L200	R152	R215	R216	R235	R236	R237	C218	C222	C241	C265
-10	K,M	1u	390	150	56k	100k	56k	100k	470p	1p	6p	470p
-11	K2,M2	820n	330	270	10k	15k	10k	18k	0.01u	3p(B)	2.5p(B)	47p

X57-6030-XX		D201	D202	D203	D204	L206	L207	R219	R225	R334	C136	C148	C150	C153	C227	C228	C235	C236	C239	C252	C255	C259	C260
-10	K,M	HVC350B	HVC350B	HVC350B	HVC350B	15n	27n	3.3k	10	10	7p(B)	1p	5p	3p	10p	27p(J)	3.5p(B)	0.3p(B)	4p	4.5p	4.5p(B)	3p	2.5p(B)
-11	K2,M2	HVC355B	HVC355B	HVC355B	HVC355B	18n	33n	2.2k	0	15	6p(B)	NO	4.5p(B)	2.5p(B)	7p(B)	8p(B)	4p(B)	NO	2p(B)	3.5p(B)	3.5p(B)	4p(B)	3p(B)



AMP
Q2 2SC5108 (Y)F
PLL IC
IC1 MB15A02PFV2E1
UL
5C
2ND LOCAL
TCXO
X1 L77-1877 -15
12.8MHz
VR1
VCCN
TO
PLL DATA
EP
DT
CK
X400 7.3728MHz
Q403 DTC 144EE
CLOCK SHIFT
LOOP FILTER
DEV
D5 MA360 (K,M) 1SV214-F (K2,M2)
F. CONT
D2, D4 MA2S376 ×2
D1, D3 MA2S376 ×2
TX VCO
Q4 2SC4228 (R44)
BUFF AMP
Q6 2SC5108 (Y)F
RX VCO
Q3 2SK508NV (K52)
T/R SW
Q5, Q7 2SJ243 -A UMC4N
RX
RIPPLE FILTER
Q8, D6 2SC4617 (S) MA2S111 -F
Q100 2SC5108 (Y)F
LO. SW
D100 D200 HSC277 ×2
5T
Q101 2SC5108 (Y)F
Q102 2SC4988 -E
DRIVE AMP
Q105 2SK2596 -E
FINAL AMP
Q107 2SK2595 -E
ANT SW
D101 HVU131 -E
LPF
ANT
DET
APC
IC100 NJM2904 V-ZB
SW
Q109 DTA 114EE
B SW
Q104 Q103 UFMMT717 2SK1824 -A
B
PABC
Q106 2SK1824 -A
Q108 DTC 114EE
Q110 DTC 114TE
THERMAL PROTECTION
D102 D103 HSC277 ×2
CHANNEL SW
ENC 0 1 2 3
CPU
IC403 38268MCA060GU
TXD RXD
READ/WRITE
APC/TUNE
WNRC 5RC
TO AFCO
SAVE MUTE
5MC EP
5TC DT
WNTC CK
PABC RLED
GLED BEEP
VCCN RX
SHIFT
UL BATT
TI
TIBI
BUSY
EEPROM
IC401 CAT24WC08 JI18
SCL
SDA
5M
S402 PTT
S403 MONI
INT
IC402 R3111N 451C-F
RESET
IC400 PST 9140NR
5V REG.
IC404 XC6201 P502PR
SB
Q402 DTA 114YE
5MC
REF
TX/BUSY LAMP
D400
D401
Q400 DTC 114EE
Q401 DTC 114EE
RLED
GLED
Q405 UPA 672T-A
5TC
SAVE
5T, 5C REG.
Q404 Q406 Q407 FP210 UMG3N ×2
Q408 DTA 123JE
5R
5RC
L212 DET COIL
CF200 CF
450kHz
IF IC
IC200 TA31136FNG
×3 2ND LOCAL AMP
TCXO 12.8MHz
Q1 2SC4649 (N,P)
38.4MHz
BUSY
CHARGE
Q200 DTA 114EE
IF AMP
Q201 2SC4649 (N,P)
XF201 MCF
38.85MHz
1ST MIXER
Q202 3SK318
BPF
L203, L204, L214 D203
TUNE
Q203 3SK318
L208, L209, L210, L211, D201, D202, D204
BASE BAND SECTION
IC301 LPF
NJM2904V-ZB
5MS
IC300 FLAT AMP
HPF
NJM2902V-ZB
WIDE/NARROW SW
Q303 DTA 144EE
WNRC
LIMITER
D300 DA221
TIBI
MUTE SW
Q302 2SK1824 -A
MUTE
VOLUME
AUDIO AMP
IC302 TA7368FG
Q307 2SK1588 -AZ
SP
Q305 2SA1362 -F(GR)
Q306 DTC 144EE
Q304 DTC 144EE
AFCO
POWER SW
REVERSE PROTECTION
D502 GN1G
BATT
VR501 DEV
Q501 2SC4617 (S)
Q502 2SC4617 (S)
LIMITER AMP HPF
IC500 NJM2100V -ZB
MIC
MIC500
Q500 2SK1824 -A
WNTC
Q504 DTA 143ZE
D500 1SS372F
D501 DAN222
AGC/MUTE
Q503 2SC4919
VR500 DQT BALANCE